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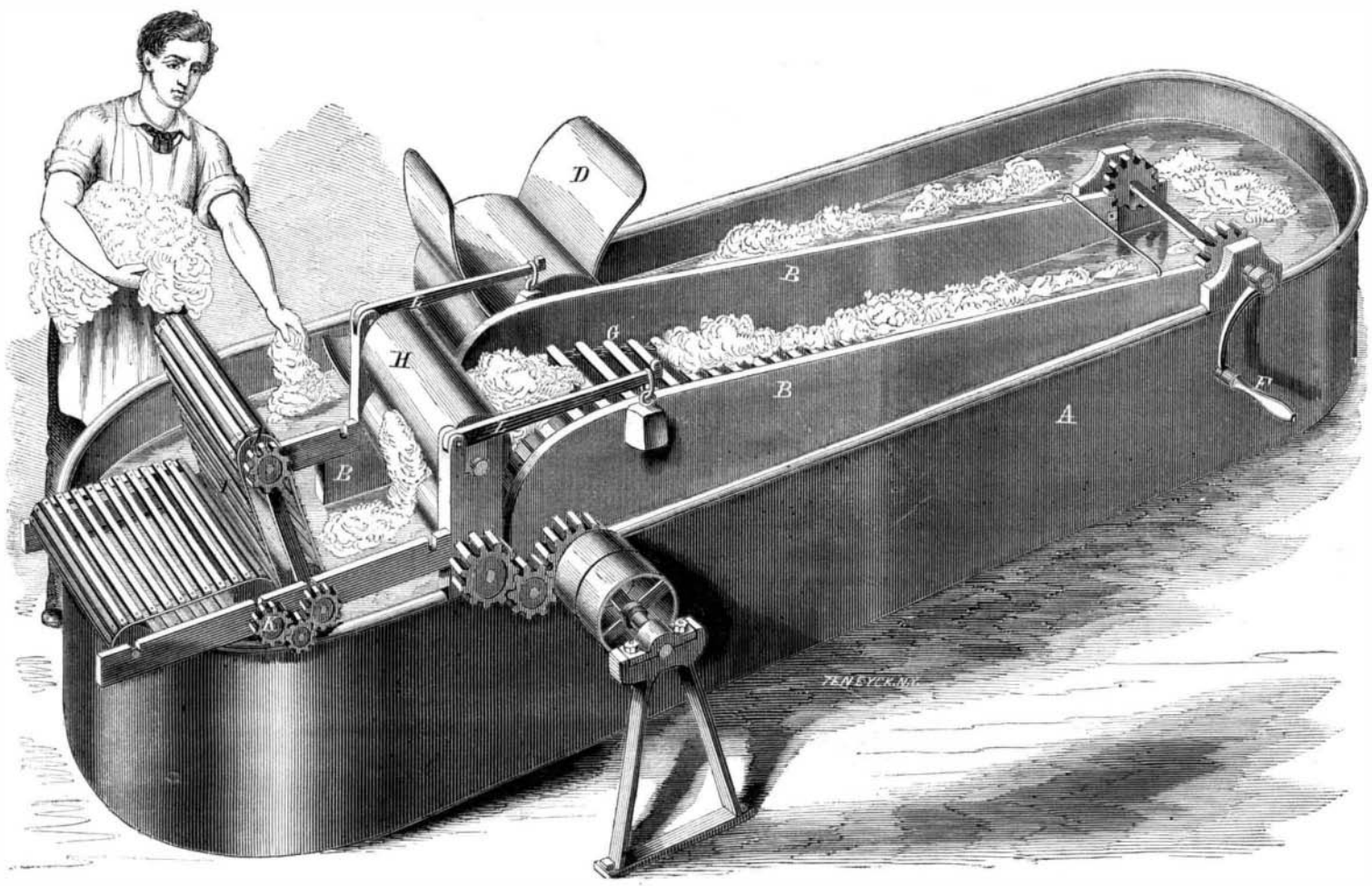

TURNER AND ROBINSON'S WOOL-WASHING APPARATUS.

Improved Wool Washing Apparatus.

After wool is sheared from the sheep it requires to be thoroughly cleansed before it is manufactured. It has been the practice heretofore to place the wool in a tub of warm water containing a small quantity of soda, and to stir it about by hand until it was cleansed, when it was lifted out by means of sticks. It was generally necessary to pass it through three waters for washing and a fourth for rinsing out the suds. But an apparatus has been invented by R. G. Turner and S. B. Robinson, of East Dedham, Mass., by which all this enormous labor can be performed by water or steam power instead of by hand; and as usual the machine work is much more perfect than that performed by hand. This apparatus is illustrated in the accompanying engraving.

An oval tub, A, say 16 feet in length and nearly three feet in hight, is partially divided longitudinally in the middle by a partition, B, leaving spaces between the ends of the partition and the ends of the tub. In the space upon one side of the partition is the wheel, D, which is made to rotate by the machiney. The tub is nearly filled with the diluted solution of alkali, and a proper quantity of wool being thrown in, the rotations of the wheel impart a current to the water; sweeping the wool and water together around the sides of the tub. As the wool passes under the wheel it receives a moderate pressure from the enlarged axle or drum portion of the wheel and is very rapidly cleansed.

When by this process the wool becomes thoroughly saturated with the alkali, one end of the frame, E, is lowered down into the tub by turning the crank, F. Now as the wool passes around the end of the tub it enters between the sides of the frame, E, and is carried by the endless apron of slats, G, up to the rollers, H, between which it passes, having the water mostly pressed out of it in the passage. After all the wool has been run a few times through the rollers, H, the apron, I, is turned down in a horizontal position, when the wool falls upon it and is carried over the end of the tub.

The floats of the wheel, D, are slightly curved as shown so that they will not pick up the wool. When the apron, I, is turned down, a pinion upon the end of the roller, I, falls into gear with the pinion, K, by which motion is imparted to the apron, I, to carry off the wool. The pressure upon the wool as it passes between the rollers, H, is increased and regulated by the weighted levers, L L, pressing upon the journal boxes of the upper rollers, H.

By this apparatus the wool is carried from one tub to another without being rehandled; it is more thoroughly washed than by hand; a smaller number of waters suffice; and the wool is delivered in a comparatively dry state.

The patent for this invention was granted, through the Scientific American Patent Agency, October 1, 1861, and further information may be obtained by addressing either of the inventors at East Dedham, Mass.

The Cause of Malaria.

An important discovery in connection with sanitary science and with physical geography has been made by the illustrious agricultural chemist, Boussingault. He lately read before the Academy of Sciences a paper in which he demonstrated, with remarkable precision, that oxide of carbon accompanies the liberated oxygen, whenever the sun shines upon a vegetable submerged in water impregnated with carbonic acid. The presence of so deleterious a gas as carbonic oxide in the atmosphere of marshy countries is manifested by this discovery, and it explains the fatal attacks which animals suffer in the health when exposed to the influence of marshy exhalations.

On the other hand, it is maintained, that in large cities where coal is consumed, as in Paris and London, carbonic oxide is much more abundant in the atmosphere than it is in the most unhealthy marshy situations, and yet marsh fevers do not prevail in those cities. This has led to the conclusion that the cause of marsh fevers is due to a solid organic body, a microscopic insect, or the *dêbris* of an insect carried through, and penetrating the air-passages of the lungs, and acting like a putrid foreign body which vitiates the whole mass of the blood in the animal by a process of putrefactive fermentation.

THE red-hot shot used in the British navy and forts is produced by pouring molten iron into shells. A small cupola furnace has been put on the *Warrior* for melting the iron to be used for such shot.

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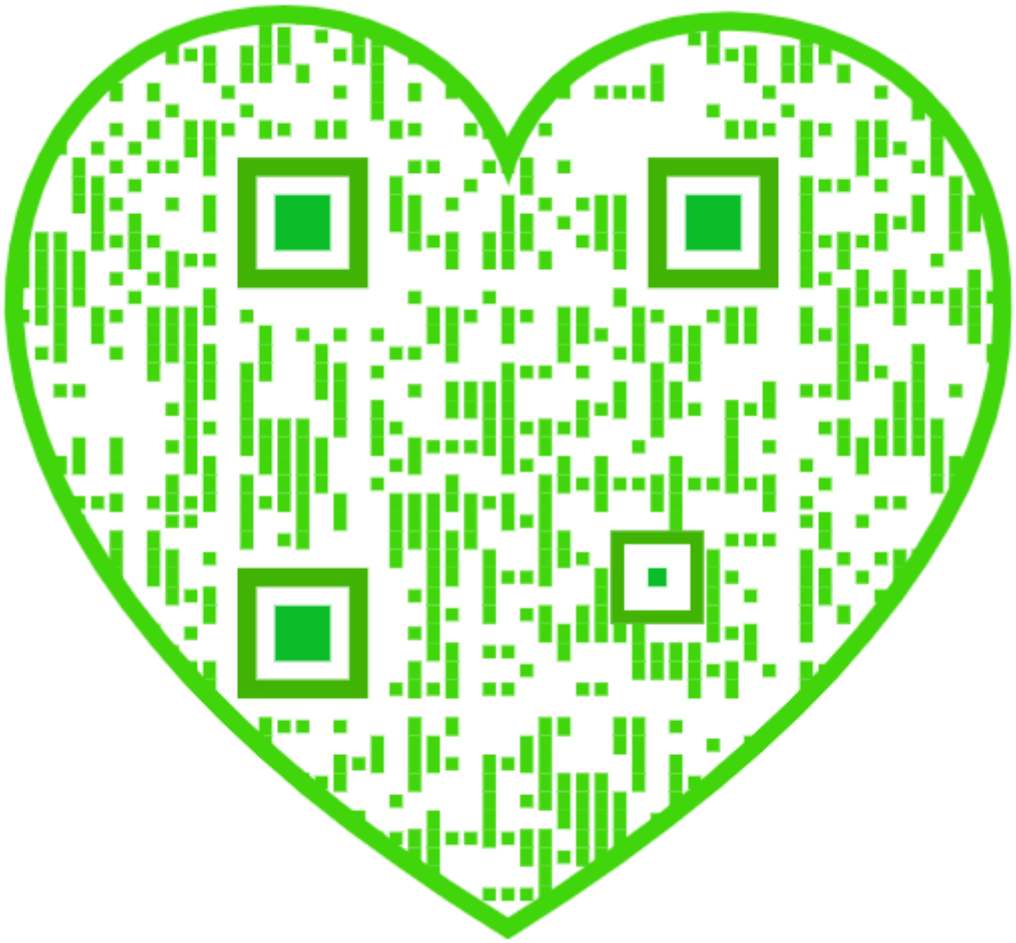

NOTES ON MILITARY AND NAVAL AFFAIRS.

SURRENDER OF MASON AND SLIDELL.

The rebel commissioners, James M. Mason and John Slidell, with their two secretaries, who were taken from the British mail steamer, *Trent*, by Capt. Wilkes, of the U. S. steam sloop-of-war, *San Jacinto*, have been again placed by our authorities under the protection of the British flag. This was demanded in a dispatch from Earl Russell, Her Britannic Majesty's Secretary of State for Foreign Affairs, to Lord Lyons, the representative of the British government in this country. After a statement of the facts of the case, the dispatch concludes as follows :—

Her Majesty's government, therefore, trust that when this matter shall have been brought under the consideration of the government of the United States that government will, of its own accord, offer to the British government such redress as alone could satisfy the British nation, namely, the liberation of the four gentleman and their delivery to your lordship, in order that they may again be placed under British protection, and a suitable apology for the aggression which has been committed.

Should these terms not be offered by Mr. Seward you will propose them to him.

To this dispatch, Mr. Seward, the Secretary of State of the United States, replies with an elaborate discussion of the law of nations in its bearing upon the case. He says :—

The question before us is, whether this proceeding was authorized by and conducted according to the law of nations. It involves the following inquiries :

1. Were the persons named and their supposed dispatches contraband of war?

2. Might Captain Wilkes lawfully stop and search the *Trent* for these contraband persons and dispatches?

3. Did he exercise that right in a lawful and proper manner?

4. Having found the contraband persons on board and in presumed possession of the contraband dispatches, had he a right to capture the persons?

5. Did he exercise that right of capture in the manner allowed and recognized by the law of nations?

If all these inquiries shall be resolved in the affirmative, the British government will have no claim for reparation.

Arguing each of these points at length, he comes to the conclusion that the first four must be answered in the affirmative, but the last in the negative, taking the same ground as the law officers of the British government, that Capt. Wilkes should have taken the steamer and brought her into port in order that the affair might have been adjudicated by a judicial tribunal. Mr. Seward intimates that the conduct of Capt. Wilkes might have been justified by old English precedents, but he shows that it was in violation of those principles of international law for which this country has always contended. In this connection he cites the following instructions of James Madison, Secretary of State in the administration of Thomas Jefferson, to James Monroe, our Minister to England :—

Whenever, he says, property found in a neutral vessel is supposed to be liable on any ground to capture and condemnation, the rule in all cases is, that the question shall not be decided by the captor, but be carried before a legal tribunal, where a regular trial may be had, and where the captor himself is liable to damages for an abuse of his power. Can it be resonable, then, or just, that a belligerent commander who is thus restricted, and thus responsible in a case of mere property of trivial amount, should be permitted, without recurring to any tribunal whatever, to examine the crew of a neutral vessel, to decide the important question of their respective allegiances, and to carry that decision into execution by forcing every individual he may choose into a service abhorrent to his feelings, cutting him off from his most tender connexions, exposing his mind and his person to the most humiliating discipline, and his life itself to the greatest danger? Reason, justice and humanity unite in protesting against so extravagant a proceeding.

Mr. Seward's reply concludes as follows :—

The four persons in question are now held in military custody at Fort Warren, in the State of Massachusetts. They will be cheerfully liberated. Your lordship will please indicate a time and place for receiving them.

The steamtug *Starlight* left Fort Warren at 11 a. m. January 1st with Mason and Slidell, and Secretaries, for Provincetown, where they will be transferred to the British war-steamer *Rinaldo*, now lying there.

THE REBELLION CRUSHED IN MISSOURI.

Generals Halleck and Pope, of Missouri, are pushing their operations with an enterprise, energy and courage worthy of emulation by our other commanders. The brilliant success related in our last has been followed by others and a *resumé* of the operations of the Union army in Missouri for the past two weeks shows that we have captured 2,500 rebels, including 70 commissioned officers, 1,200 horses and mules, 1,100 stand of arms, ten tuns of powder, 100 negroes and an immense amount of commissary stores and camp equipage, and all this with the loss only of a hundred men killed and wounded. General Price is in full retreat for Arkansas, having passed through Springfield on Monday the 23d of December.

THE SITUATION IN KENTUCKY.

In the southwest part of the central portion of the State is the town of Bowling Green. It is a place of some 3,000 inhabitants, and is situated on the line of the Louisville and Nashville railroad, 113 miles from Louisville and 72 from Nashville. It is at the head of steamboat navigation on Barren river, a branch of Green river which runs a short distance north of the town and flows northwest into the Ohio. At last accounts the largest rebel force in the State was at Bowling Green, and General Buell with a large Union army was advancing from the north. We have reports even that his advanced division of 60,000 men had crossed Green river, and that a great battle might be expected very soon.

GENERAL BURNSIDE'S EXPEDITION.

The preparations for this expedition are being rapidly pushed forward at Annapolis and Fortress Monroe, and it is expected to sail in a few days. Its destination is unknown.

THE CLOSING OF CHARLESTON HARBOR.

The fifteen old whaling vessels, which have been so long in course of preparation for being sunk in the channel of Charleston harbor, reached their destination and were placed in position on the 19th of December. They were towed over the bar by the steamers of the blockading squadron, and as each reached her position, the plug was withdrawn and she quietly settled down. They were first dismasted by cutting the shrouds on the weather side, when the whole of the rigging fell over to leeward with a crash. They were filled with stones, and they completely block up the main channel in which they were sunk.

COMMODORE PORTER'S EXPEDITION.

A flotilla to operate against some of the southern sea coast fortifications is in process of preparation, and will be ready within a few weeks. In addition to a number of steamers and other vessels, it will contain 21 schooners, each armed with a mortar for throwing shells. A part of these schooners have been built for the purpose, and others were purchased from the merchant service. Those that were bought are hauled up on railways and cut down near the waterline; the lower portion is strengthened in a very thorough manner, and the upper portion of the sides is built up some two feet thick with solid timber. A support for the mortar is constructed amidships of solid timber from the floor of the vessel to the deck. The mortars weigh 8½ tuns each, and throw shells 13 inches in diameter. Each schooner carries two guns besides the mortars. The flag ship of the flotilla is a large, fine, ocean-going steamer built on the plan of a ferryboat to run either end foremost. This is to facilitate her movements in narrow channels and rivers.

THE ARMY ON THE POTOMAC.

In the meantime, the great army on the Potomac is shivering in its tents—waiting.

The London *Times* states that some further experiments with the Armstrong guns took place recently under the direction of the Ordnance Select Committee, when two 100-pounder guns of the ordinary service pattern fired a large number of consecutive rounds at the Woolwich butt. The rapidity of fire was nearly uniform throughout. One 100-pounder fired its last fifty rounds in 34½ minutes, and the other 100-pounder fired its last 50 rounds in 33½ minutes. This included every stoppage. The guns were not sponged for 70 and 80 rounds respectively, and remained clean to the end. There was no escape whatever of gas from the breech.

MR. E. WATKIN, who lately went from England to Canada to examine into the condition of the Grand Trunk Railway, has stated to the proprietors that, among other things, he obtained the alteration of forty heavy tenders (18 or 19 tuns each), hitherto running on four wheels only, and which, in his opinion, were a main cause of the excessive breaking of rails of last winter. The work had been completed; twenty engines would also be fitted up in time for the winter with Giffard's injector, the use of which in substitution for or in addition to the ordinary pumping apparatus would, he believed, save much of the inconvenience caused by disabled engines in severe frost.

The Manufacture of Salt in Michigan.

The dearth of this article the Southern States, and the suffering that has followed from its scarcity in many localities there, makes any facts in regard to salt and its manufacture of much interest at the present time. Michigan is a great salt producing state. However, before the year 1859, business of boring for salt had never been attempted—hardly thought of. This business has been prosecuted since that date with much energy and success. In April, 1859, operations were commenced at Great Rapids and East Saginaw. The business at the former place has never amounted to much; but at the latter, the work has been exceedingly successful.

The brine from which the salt is obtained, is procured by boring wells to great depths below the surface. After passing through about one hundred feet of soil of various kinds, they penetrate brown sandstone, and with alternations of strata of clay shales, limestone and sandstone, with occasional thin seams of coal, they enter the salt-bearing sandstone at depths ranging from 480 feet, at Bay City, near Saginaw Bay, to 714 feet, at Saginaw City, eighteen miles distant. The East Saginaw Manufacturing Company have produced about 20,000 barrels of salt.

The works now in operation are the following :—

Name of Company.	*No. of wells.*	*No. of kettles.*	*Investment.*
E. Saginaw Salt Man. Co.	2	200	$30,000
Saginaw City Man. Co.	1	60	15,000
Hall, Gilbert & Co.	1	..	5,000
Carrolton Mill Salt Co.	1	120	12,500
Curtis, Ward W Clark,	1	60	10,500
Saginaw Valley Salt Co.	1	60	10,000
Portsmouth Salt Co.	1	50	10,000
Bay City Salt Co.	1	50	10,000
Total.	9	600	$102,500

These works produce in the aggregate about 550 barrels daily. It is probable that before another fall, there will be investments engaged in the manufacture of salt from $300,000 to $400,000 in this district, where not a bushel of salt was produced prior to the summer of 1860. The aggregate production for 1861 has probably reached 100,000 bushels.

THE DUTIES RAISED ON TEA, COFFEE, SUGAR AND MOLASSES.—On the 23d of December, Congress passed an act increasing the duties on coffee, tea, sugar and molasses, and the act was signed by the President. The duties now are on tea, 20 cents per pound, on coffee, 5 cents, on sugar, 2½, 3, 5 and 8 cents, varying with the quality, and on molasses, 6 cents per gallon. The act went into effect immediately on its passage, applying even to the articles which have been stored in the bonded warehouses.

IT appears that the Italians have 83 men-of-war, with 989 cannon and 13,480 horse power. The Austrian navy has only 80 ships, with 703 cannon and 6,473 horse power, and Spain 144 ships, 907 cannon, 13,040 horse power. Italy has, beside, eight frigates in the docks, four of which will be launched within a few months. The new law for naval conscription will add 2,500 to 3,000 sailors to the present force.

THE GALWAY LINE.—By the English Post-office report it appears that the public loss upon each letter conveyed last year to the United States by the Galway steamers was 6s. But the greatest absolute loss was on the West Indian line; £200,000 of the £240,000 subsidy being a dead loss.

A TERRIFIC explosion of paraffine, the second that has been reported within the week, took place on Saturday, December 7th, on the premises of Mr. Barnett, grocer and druggist, of Smithfield, Birmingham, England. Several persons in the shop were injured.

THE London *Engineer* asserts that while wages and iron are much higher in America than in England, locomotives of the same weight and dimensions in the United States, range at from 20 to 25 per cent lower prices.

A MONUMENT is about to be erected to the memory of Sir Humphrey Davy at Penzance. It will consist of a granite column and base, surmounted with a statue of the great chemist holding a safety lamp in his hand.

THE LANCASHIRE COTTON MILLS.—Returns from 1,233 mills, ordinarily employing 266,507 persons, show a diminution, at present, of 84 per cent from their ordinary scale of employment.

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IMPORTANCE OF SLEEPING WITH THE MOUTH SHUT.

We have received a very curious pamphlet from George Catlin, the famous painter and investigator of the habits, customs, character and ethnology of the Indian tribes. Mr. Catlin observed, many years ago, that those tribes of Indians who have not been corrupted by contact with the whites, have remarkably fine figures, perfect teeth and robust constitutions, and are free from most of the diseases which prevail in civilized communities. Naturally anxious to learn the cause of this superiority, he was led to make inquiries and observations in relation to it, and after a long series of investigations he has come to the conclusion that it is to be attributed to a very great extent to the manner in which Indians breathe, they breathing at all times through the nose, while whites breathe very much through the mouth. His pamphlet is entitled "The Breath of Life," and it bears the motto—

{ All Life (on Earth) is Breath. }
{ All Else (on Earth) is Death. }

The following extracts embrace Mr. Catlin's most interesting facts, and they will give a good idea of the course of his reasoning :—

THE WAY THE HABIT IS ACQUIRED.

"When I have seen a poor Indian woman in the wilderness, lowering her infant from the breast, and pressing its lips together as it falls asleep in its cradle in the open air, and afterward looked into the Indian multitude for the results of such a practice, I have said to myself, 'glorious education! such a mother deserves to be nurse of emperors.' And when I have seen the careful, tender mothers in civilized life, covering the faces of their infants sleeping in overheated rooms, with their little mouths open and gasping for breath ; and afterward looked into the multitude, I have been struck with the evident evil and lasting results of this incipient stage of education ; and have been more forcibly struck and shocked when I have looked into the bills of mortality, which I believe to be so frightfully swelled by the results of this habit thus contracted and practiced in contravention to nature's design."

BREATHING THROUGH THE MOUTH NOT NATURAL.

"We are told that 'the breath of life was breathed into man's nostrils'—then why should he not *continue* to live by breathing it in the same manner ? The mouth of man as well as that of the brutes, was made for the reception and mastication of food for the stomach, and other purposes ; but the nostrils, with their delicate and fibrous linings for purifying and warming the air in its passage, have been mysteriously constructed, and designed to stand guard over the lungs—to measure the air and equalize its drafts during the hours of repose. The atmosphere is nowhere pure enough for man's breathing until it has passed this mysterious refining process, and therefore the imprudence and danger of admitting it in an unnatural way, in double quantities, upon the lungs, and charged with the surrounding epidemic or contagious infections of the moment. The impurities of the air which are arrested by the intricate organizations and mucus in the nose, are thrown out again from its interior barriers by the returning breath ; and the tingling excitements of the few which pass them, cause the muscular involitions of sneezing, by which they are violently and successfully resisted. The air which enters the lungs is as different from that which enters the nostrils as distilled water is different from the water in an ordinary cistern or frog pond. The arresting and purifying process of the nose, upon the atmosphere with its poisonous ingredients, puffing through it, though less perceptible, is not less distinct, nor less important than that of the mouth, which stops cherry stones and fish bones from entering the stomach.

"In man's waking hours, when his limbs and muscles and his mind are all in action, there may be but little harm in inhaling through the mouth, if he be in a healthy atmosphere, and at moments of violent action and excitement it may be necessary. But when he lies down at night to rest from the fatigues of the day, and yields his system and all his energies to the repose of sleep, and his volition and all his powers of resistance are giving way to its quieting influence, if he gradually opens his mouth to its widest strain, he lets the enemy in that chills his lungs—that racks his brain—that paralyzes his stomach—that gives him the nightmare—brings him imps and fairies that dance before him during the night ; and during the following day, headache—toothache—rheumatism—dyspepsia, and the gout."

THE DISEASES PRODUCED.

After pointing out that the organs most quickly affected by a wrong mode of breathing, are the lungs and their connections, including the bronchial tubes, the throat, the tongue and the teeth, our author says :—

"Besides the list of fatal diseases already given and which I attribute chiefly to the pernicious habit which I have explained, there are other results affecting the senses, personal appearance, and the enjoyments of life, which, though not *fatal*, are themselves of sufficient importance to demand its correction ; such as curvature of the spine, idiocy, deafness, nightmare, polypus in the nose, malformation and premature decay of the teeth, toothache, tic-douloureux, rheumatism, gout and many others, to which the brute creation are strangers, and to most of which the savage races are but little subject."

THE EFFECTS ON THE TEETH.

"The teeth of man, as with the brutes, are wisely constructed to answer their intended purposes through the natural term of life, and would so, no doubt, but from abuses, the principal one of which I consider to be the pernicious habit already explained. The saliva exuding from the gums, designed as the element of the teeth, floods every part of the mouth while it is shut, continually rising, like a pure fountain, from the gums, at the roots of and between the teeth, loosening and carrying off the extraneous matter which would otherwise accumulate, communicating disease to the teeth, and taint to the breath.

"Among the native races they seem to have a knowledge of these facts, and the poor Indian woman who watches her infant and presses its lips together as it sleeps in its cradle attracts the ridicule perhaps, or pity, of the passer-by, but secures the habit in her progeny which enables them to command the admiration and envy of the world. These people who talk little and sleep naturally, have no dentists nor dentifrice, nor do they require either ; their teeth almost invariably rise from the gums and arrange themselves as regular as the keys of a piano, and without decay or aches, preserve their soundness and enamel and powers of mastication to old age ; and there are no sufficient reasons assigned yet, why the same results, or nearly such, may not be produced among the more enlightened races, by similar means. Civilized man may properly be said to be an open-mouthed animal ; a wild man is not. An Indian warrior sleeps, and hunts and smiles, with his mouth shut, and with seeming reluctance, opens it even to eat or to speak. An Indian child is not allowed to sleep with its mouth open, from the very first sleep of its existence ; the consequence of which is, that while the teeth are forming and making their first appearance, they meet (and constantly feel) each other ; and taking their relative natural positions, form that healthful and pleasing regularity which has secured to the American Indians, as a race, perhaps the most manly and beautiful mouths in the world.

AN INDIAN'S OPINION OF ENGLISHMEN.

Of the party of fourteen Ioway Indians, who visited London some years since, there was one whose name was Wash-ke-mon-ye (the fast dancer), he was a great droll and somewhat of a critic, and had picked up enough of English to enable him to make a few simple sentences and to draw amusing comparisons. I asked him one day how he liked the white people, after the experience he had now had ; to which he replied—"Well, white man—suppose—mouth shut, putty coot, mouth open, no coot—me no like um, not much." This reply created a smile among the party, and the chief informed me that one of the most striking peculiarities which all Indian tribes discovered among the white people, was the derangement and absence of their teeth, and which they believed were destroyed by the number of lies that passed over them."

The pamphlet is published by John Wiley, of New York city, and sold for 25 cents. We advise all persons, especially parents, to procure it.

It is said that the Secretary of the Treasury has ordered the devices on our national coin to be so changed as to signify the religious faith of the nation, and its trust in a Supreme Being.

Railways in Chili---American Engineers Abroad.

The *Railway Times* contains the following on the construction of railways in Chili :—

The railway between Santiago, the capital, and Valparaiso, the seaport of Chili, was projected in 1851, and the works commenced at Valparaiso in October, 1852. About thirty-two miles of the line have been opened to the public for nearly five years. Unforeseen delays occurred to stop all further progress until last month, when a contract was entered into by the government and the present contractor for the works of the Southern Railway of Chili. This contract obliges the contractor, Mr. Henry Meigs, an American, to deliver up the railway complete in three years, and the amount of the contract is $6,000,000.

The Southern Railway of Chili is the main artery of the country, and it is proposed to extend it south from the capital, a distance of 170 miles. About 52 miles have been opened for traffic for three years, and the works of the extension are being rapidly carried out. The principal engineering works on this railway are the bridges, which are numerous and of considerable extent, to suit the sudden risings of the rivers in the floods of the rainy season, and the floods caused by the melting of the snow in the Cordilleras. The 32 miles of this railway were constructed by Mr. Evans, an American engineer, and all the bridges are on the trussed systems, known as Long's patent, and Bollman's combinations of cast and wrought iron. The present engineer-in chief, Mr. Cross Buchanan, has adopted plate girders for all his bridges on the division under contract. Although perhaps not so elegant and light looking, the girder bridges are not less suitable to the country, and the difficulty of erecting and finishing them can be overcome by a judicious division of each girder into pieces suited to the mode of transport into the interior. The first large bridge of this kind yet erected in Chili was opened for traffic on the 18th of September last. It has nine spans of 60 feet, and was erected and finished in less than two months after the arrival of the first sections from the coast.

Distress and Impending Famine in Ireland.

We take the following from the Dublin *Agricultural Review* :—That much and serious distress exists at the present moment in the western districts of Ireland is but too true. Letters from various parts of the country testify to that unfortunate fact. Professional men, surveyors and valuators, whose duties necessarily lead them into remote districts, not altogether on "outside cars, going at a rapid rate," are ruluctantly obliged to admit the existence of considerable and wide-spread distress. Commercial men, too, like Mr. M'Swiney, who, in the interest of trade, require of their correspondents and travelers to inform them of the condition of the people, have also told us how much of suffering and privation is already being experienced by the peasantry and small farmers of the country. It is useless attempting to disguise the facts. The thing is unfortunately too real already, and the sooner we set out earnestly to grapple with the evil the better it will be for all classes. Extensive employment, of some kind or other, must be provided for the people to keep them from starvation or from burthening the rates. Let us trust, however, that the mistakes of 1846 will not be repeated, with respect to the nature of the works to be undertaken. It is generally admitted, however, that the want of fuel is one of the chief causes of the prevailing distress. Fabulous prices are now being paid for a cleeve of turf in parts of the West. Coal is not to be had for any money. This is a state of things most melancholy to contemplate.

There is an abundance of turf cut in all the bog districts ; but, being saturated by the continuous wet weather, it is, of course, totally unfit for fuel. It is perfectly manifest that the ordinary method of drying it fails at this season. Here is the misfortune. Is there no possibility of making this moist peat available for fuel ?

THE TELEGRAPH ON WAR SHIPS.—The London *Post* states that an iron clad elevated room is built on the after deck of the *Warrior*, and fitted with telegraphic apparatus, communicating with the engine room and all the apartments of the vessel. In this room the commander witnesses in comparative safety all that is going on and sends his orders with lightning speed to any part of the ship.

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Meerschaum Mania.

The value of the meerschaum pipes and cigar tubes imported into the United States in 1858, it is stated, amounted to $200,000, a great sum to be wasted on a *mere sham*. This is really getting to to be a serious business. It is bad enough to waste time and money —to say nothing of breath—in the consumption of the evil weed, but when to this is added the mania for coloring expensive pipes, thus increasing the habit of smoking, the folly of it all is really too preposterous.

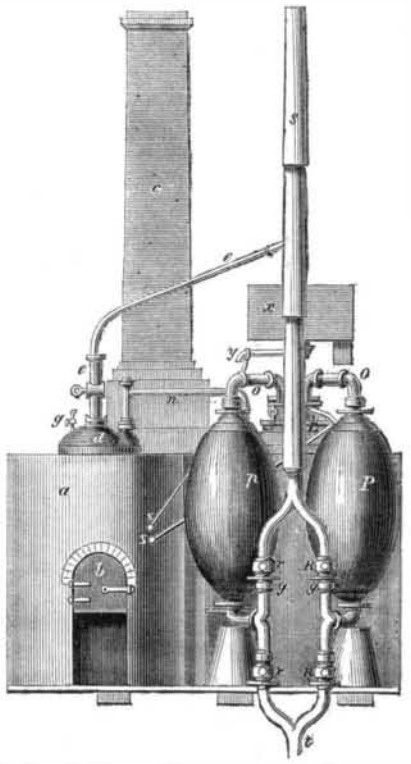
We were amused the other day at hearing a young but ambitious smoker gravely asserting that meerschaum was made of the foam of the sea! This impression has probably arisen from the German work used to designate the material—*meerschaum* meaning *sea foam*—a poetical figure of speech, alluding to its lightness and whitish appearance. It is properly magnesite, a mineral of soft earthy texture somewhat resembling chalk, found in Spain and other countries at the head of the Mediterranean. To produce the yellow and brown colors so much admired in the pipes, and which are brought out only after long smoking, the blocks of which the pipes are made, are kept for some time in a mixture of wax and fatty matters. A portion of these is absorbed, and being subsequently acted upon by the heat and the tobacco fumes, assumes various shades of color. Thus the smoker in coloring his pipe, is employed in the dignified business of mingling tobacco smoke with a mixture of wax and grease!

Here we are reminded of a little incident which recently took place within our knowledge, and which amusingly illustrates the folly of meerschaum coloring. A gentleman had an expensive meerschaum, which he doted upon, but which notwithstanding all his smoking he could not color so fast as he desired. In fact, after long puffing, it only showed one little spot of brown. Some of his friends told him they did not believe it would ever color, and the indefatigable smoker grew quite despondent. One evening his wife who naturally sympathized with him in trouble, took up the pipe during his absence and while examining it brought it over the flame of a lamp. Immediately a strong color was brought out by the heat, much to the surprise of the lady. Laying the pipe away, however, she said nothing about the matter. On the following morning when the gentleman made his usual inspection of his beloved pipe, his delight and amazement knew no bounds. His meerschaum had colored splendidly, and all owing to his indefatigable puffing! He displayed it in triumph to his friends, and became a more firm believer than ever in the virtues of tobacco smoke. Meantime his good lady said nothing, but she has imparted the secret to her female friends that they may be able to assist their husbands in their arduous endeavors to color their meerschaums. She is a very benevolent lady, and wants to do all the good she can in the world.—*Portland Transcript.*

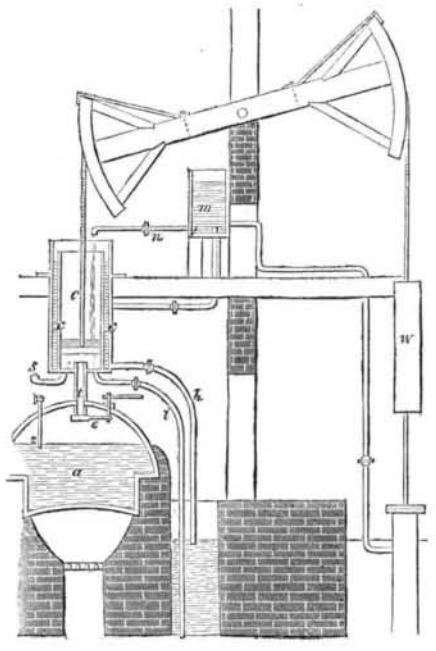
SURFACE CONDENSERS FOR STEAM ENGINES.

The following description is taken from the London *Engineer*, being a paper read before the Society of Engineers by John Louch. It will be found not only interesting but profitably useful by all who are interested in condensing, especially marine engines, as urface condensers appear to be rapidly superseding the old inside sort both in Europe and America. Mr. Louch said:—"In order to fully understand our subject it will be necessary to look a little to the history of the steam engine. Passing over the early inventions of Hero, De Caus, Branca, the Marquis of Worcester and others, as being impracticable or problematical, we come to the first really useful engine of Savery, in 1698, which was the only one of that period having any practical value, introduced to any extent for mining or other purposes."

The accompanying figure represents Savery's complete engine, invented in 1698, but we will only describe the condensing feature of it as that is all that is necessary. The two vessels, *p* P, are connected with the steam boiler by pipes *o* O, and with a well by the suction pipes, *r* R, and also with a discharge pipe, *s*, by the branch pipes, *g g*. This engine was only used for raising water from mines. The steam from the boiler passed by pipe O into the vessel, P, and when full the steam was shut off, then a stream of cold water from the cistern, *x*, flowed over the surface of the chamber, P, and condensed the steam, forming a vacuum inside. Communication was then opened with the well below, and the water ascended through pipe *t* into P. The same operations were performed with the other chamber, *p*, and the two thus acting raised a constant stream of water by surface condensation.



The great waste of steam caused by its contact with the water in the vessel, *p*, soon led to the abandonment of Savery's scheme in favor of engines with cylinder and piston working ordinary lifting pumps through the intervention of an overhead beam, as shown in Fig. 2. This engine was the invention of Mr. Newcomen, and was patented and extensively introduced by himself and his partners Savery and Cawley. After having been converted into an injection engine it remained long in use, even after being to a considerable extent, superseded by the improved engine of James Watt; indeed it may be possible even new to find it still working in some of the more primitive colliery districts.



In Newcomen's engines as originally constructed and represented, the steam is admitted from the boiler, *a*, into the cylinder, *c*, which, when the air has been expelled, and the cylinder filled with steam, is closed. Cold water is then admitted by the cock, *n*, from the cistern, *m*, and filling the casing, *c*, around the cylinder, condenses the steam therein, and thereby produces a vacuum. The atmospheric pressure now comes into operation and depresses the piston, which, by its connection with the overhead beam at the inner end, raises the other end which is attached to and works the pump. The cock, *n*, is now closed, and *h* opened to allow the condensing water to flow off into the cistern. The cock, *n*, is again opened, and the steam admitted into the cylinder by which the air and condensation water are expelled through the snifting pipe, *t*; and the counterweight, *w*, now preponderating, raises the piston to the top of the cylinder, and another stroke commences, as before described.

In working one of these engines it was observed on one occasion to make several strokes in quick succession; and on searching for the cause, a hole was found in the piston (which admitted the water which was supplied to the top for the purpose of keeping the packing air-tight) to the cylinder. Taking advantage of this accidental discovery, they were afterward invariably made with a jet of water injected into the cylinder, instead of merely to its external surface as before; and condensation by surfaces of cold metal was for some time abandoned.

Raising a Sunken Ship.

The British ship *Sovereign of the Seas*, while at Sidney, New South Wales, last summer caught fire in her upper works, and to save her from entire destruction, she was scuttled and sunk in 28 feet of water. Various plans had been proposed to raise her, by captains who had arrived at Sidney, but all were rejected as impracticable by Lloyd's agent at that place. At last Captain Lachlan McKay, of Boston, arrived in the ship *Nagasaka*, and having examined the sunken vessel, offered to raise her in one week. The proposal was deemed somewhat fanatical, but it was accepted. A large bagging of canvas was made, sufficient to cover both sides of the ship from the bilges to the plankshеer. The lower edge of this vast sheet was sewed securely to a small chain which sunk it to the required depth, after which it was hauled tight with powerful tackels, which kept it in its place. The upper edge was nailed, and otherwise secured along the line of the plankshеer. Extra pumps were rigged down all her hatchways and manned by gangs, who kept them going without intermission, and in five hours she floated and became upright. In three days from the time Captain McKay commenced operations the ship was ready to have her cargo discharged. The Sidney *Herald* speaks in high terms of this feat of ship-raising. Captain McKay raised the clipper ship *Great Republic* in the same manner, after she had been scuttled to save her hull from destruction by fire while lying at one of the docks of this port (New York), several years ago.

The British and American Navies.

The whole force of the British navy numbers 431 steam vessels and 182 sailing vessels. This would make a total of 613 actual war vessels, without including the large number of transports and other ships that could, at short notice, be converted into men-of-war. The fleet would carry 15,000 guns, and some 84,000 seamen. The effective force of the American navy is 82 sailing ships, carrying 847 guns, and 164 steamships, carrying 1,055 guns. The Secretary of the Navy makes the whole effective force 264 vessels, 2,557 guns, and about 23,000 seamen; but he includes in his list receiving ships, and ships of the line that have been on the stocks since 1818. The House of Representatives has passed a bill authorizing the construction of twenty iron-clad gunboats to be built by contract or otherwise as the Secretary of the Navy may deem best for the public interest.

A Wooden Mother.

We have heard of wooden nutmegs, wooden hams, horn gun-flints, wooden oats, and wooden clocks, but what infusion of the Yankee ever tinctured a John Bull to invent a wooden *mother!* The following, by a correspondent of the *Mark Lane Express*, describes the new invention.

A fine sow, having twelve sucking pigs, belonging to a pork merchant in Monkwearmouth was taken ill, and died suddenly. The proprietor who is an ingenious character, set to work and formed a rough model of a sow in wood, being hollow in the center, the abdomen being furnished with twelve teats, cleverly formed of raw hide. The interior of the model is kept filled with milk and the whole of the young pigs suck from the teats of this singularly looking wooden sow, and all are thriving well.

THE reserve fleet at Portsmouth, England, consists of eight line-of-battle ships, six frigates, four corvettes, and twelve sloops, armed with 1861 guns, and propelled by engines of 13,942 horse power. This does not include the *Black Prince*, which is nearly ready.

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Correspondence

Practical Hints for Dressing Saws.

MESSRS. EDITORS :—I have been engaged more or less for the past seven years in lumber making, and presume my experience has led me to differ in some respects as to the best method of dressing mill saws. And I may here say, a saw may be hung true and right in every respect (which is a very important consideration), and yet, if it be not properly set and filed, it is impossible to make good lumber with the least expense of power. My plan of "dressing up" a saw is as follows :—First, widen the points of the teeth by holding a piece of steel, made for the purpose, against the under edge, and using a light hammer on the top until the point is 1-32d part of an inch wider than the thickness of the saw. This process also draws and toughens the points, so that they are not so liable to crumble when sawing hard wood. Secondly, set the teeth as nearly alike, each way, as possible. Thirdly, hold the file perfectly square against the teeth, and point it straight. Fourthly, file the under edge of the teeth a very little beveling (I use a file right and left-handed) by holding the handle of the file a little above a level, which makes the file cut better and does not wear it out so fast ; then dress them to a square point from the top by holding the file right-handed on the upper edge of the tooth of which the under edge was dressed left-handed, and *vice versa*. If, upon trying the saw in a straight log, it should incline either way from a straight line, the next time in filing I alter the bevel on the under edge of the teeth to remedy it. After my saw is dressed so as to run straight, I hardly ever use a file except on the teeth to sharpen them, and the hammer and steel to keep the points as above stated and never have any trouble in running it straight. It will be observed, by practice, that this method saves considerable time and some files in sharpening saws. The "rake" must differ with different kinds of wood and hangings. In making new teeth I generally make them 1¼ inches at the root and two inches long, with the point inclined downward ¼ of an inch.

Your valuable paper has been a welcome visitor in our family for several years and is cagerly looked for by each member. I guess you can safely count on me as a life-subscriber. Since the war broke out my father commenced taking a daily paper in order to get the war news earlier, but there were so many reports and not a few of them contradicted next day, and some even in the same column, that he abandoned it, and said he had rather wait for the SCIENTIFIC and then he should have the news correctly given.

OTIS SMITH.

Curious Phenomenon.

MESSRS. EDITORS.—I was much delighted with a natural phenomenon which my son observed a few days since while watching the movements of the fish in an aquarium belonging to a friend, and I thought it might interest your readers to call their attention to it. By placing the eye near the side or end of the vase below the level of the water, and looking upward, an inverted image of all the interior of the aquarium with its finny inhabitants sporting apparently in the air above the vase can be seen, as if the surface of the water was a mirror, and reflected all below, giving the fish the appearance of swimming on their backs. My friend had never observed this phenomenon, although he has spent hours watching the movements of his aquatic pets. I do not know whether this property of fluids in reflecting double is generally known. If you think it worth noticing you can inform your readers how to get an inverted view of their aquaria. From the foregoing it appears that the surface of transparent fluids have the property of reflecting from both the upper and lower surfaces.

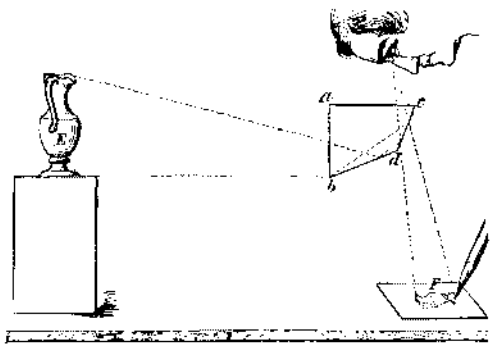
A. F. WARD.

Phildelphia, Pa., December, 1861.

This is just as truly an original discovery of our correspondent as if it had never been made before. It so happens, however, that he is not the first discoverer. It has long been known that when light passes from one medium to another a portion of it suffers reflection from the surface at which the remainder emerges. The larger the angle of incidence the greater is the proportion of the light that is reflected, until an angle is reached at which it is all reflected. This angle varies with different media ; light passing from water into air is all reflected at any angle greater than 48° 35′, and from ordinary glass at any angle greater than 41° 59′, consequently a ray of light cannot come out of water or glass at angles greater than these.

Fish and other objects in an aquarium are reflecting diffused light in every direction, and that which reaches the surface of the water at an angle greater than 48° 35′ is all reflected as from the surface of a mirror, and if the eye is placed in a proper position to receive the reflected rays, an inverted image of the aquarium will be seen as if a mirror were placed with its face down upon the surface of the water.

This property of light was rendered available by Wollaston in the construction of the camera lucida, a little instrument that is used daily by the artist who makes the drawings for those engravings that are so universally admired in the SCIENTIFIC AMERICAN.



A glass prism, *a b d c*, is mounted at the end of a rod so that it may be supported at a suitable hight above the table. The prism has its angle, *a*, a right angle, and its angles, *b* and *c*, each 67½°, these being the proper angles to cause the ray of light entering the prism in a direction perpendicular to the side, *a b*, to be reflected by the two sides, *b d* and *d c*, vertically upward. If the light is then received by the eye, an image of the object, E, from which the light proceeds, is formed in the eye, and it of course appears in the direction from which the light enters the eye, that is vertically downward. An image, F, of the object is accordingly seen as if resting upon the table. As the light which comes from the table or from a pencil point upon it, passes through the glass prism, the table and pencil can be seen as well as the image, F, and thus the image can be correctly and rapidly drawn upon the table or upon a piece of drawing paper resting upon it.

The camera lucida is applied to the microscope for making drawings of objects too small to be visible to the naked eye, and it is much used in sketching landscapes, as it gives a perfectly accurate perspective.

Waste of Fuel in Steam Boilers.

MESSRS. EDITORS :—As you frequently request practical men to send you brief accounts of discoveries and improvements in their several branches of industry, I take the liberty of giving the result of some thought and observation in my own department—that of a steamboat engineer. I do so, however, with hesitation, knowing that the subject of my remarks is one that the whole engineering world has made a special study, to wit : The best form and arrangement of boiler for the generation of steam, and wherein the improvement I propose consists mainly in dispensing entirely with the good old plan of using a draft to make the fire burn.

I have long believed that the heat carried off up the chimney by this same draft has been almost the sole cause of that great loss that occurs in the practical application of coal to the generation of steam, the useful effect of the fuel being little more than a third of that which accurate experiments say it should be. To this source of waste I think much of the attention given to expansion, steam jacketing, superheating, &c., including volumes of abstruse calculations, might have been much more profitably directed.

My experiments to demonstrate the extent of this loss have been of a rude character, yet sufficient, along with a little reflection, to convince myself that it is far greater than commonly believed. I found that the temperature of the escaping gases at the foot of the stack, in a double-flued cylinder boiler, well set in masonry, and only moderately fired, were sufficient to melt zinc, or about 750°. In the case of our western river boilers, of same construction, we do not think we are quite up to our work, except the flame or gases, hot enough to be luminous, come nearly through the flues. In the first instance, the velocity of the draft is probably thirty feet per second ; in the latter, where the blast is used (a jet of steam in the flues) it is at least three times as great. Conceive of these columns of highly heated gases rushing off with such speed, and yet not taking with them the greater portion of the caloric produced in the furnace. To me it is impossible. But by comparing the relative volumes of heated gases and of steam from the engine, we may form a still better idea of the true condition of things. We have accurate data from which to calculate the volume of the gases that pass off in a given time. On the boat where I have lately been employed, we burn 450 bushels Pittsburgh coal per day, or, at 76 pounds to the bushel, 22½ pounds per minute. The engines are two 15-inch cylinders, 4½ feet stroke, cutting off at ⅝, and making, with 150 pounds pressure of steam, 25 revolutions per minute. We use a jet of steam 3-16th of an inch in diameter in each of the four flues, thus making a very strong draft. It has been ascertained by careful experiments that about 465 cubic feet of heated products result from the combustion of one pound of bituminous coal, which, multiplied by 22½ pounds of coal per minute, gives 10,385 cubic feet, as the bulk of the products in one minute. In the same time the engine has received 800 cubic feet of steam, at a little less than 150 pounds pressure, which, expanded ten times, is 8,000 cubic feet of steam, at about 220°

These are the respective volumes, approximately, the gases varying from a temperature of 700° to 1,100°, or about the point where they become luminous. Is it not evident that near one-half the coal will continue to be worse than wasted, requiring to be stowed, carried, put into the fire, &c., until a remedy is provided? But some one will say that this only takes place where coal is not burned in the present approved manner. But 8,000 cubic feet of steam, as above, is equivalent to as many cubic inches of water, which weighs 288 pounds. This, divided by 22½, gives nearly 13 pounds of water evaporated by one pound of coal, a very good result, and much greater than could be expected from our old-fashioned apparatus.

Having satisfied myself where the coal went I wished to remedy the evil. This seemed a more difficult task. Accident, however, gave me a hint that made all plain. I wished to get some large articles japanned, but the workman said his oven frame was too weak to support them near the top, and that the heat would not be great enough near the floor to harden the varnish, as the intensely-heated air always ascended to the upper part of the oven. I understood this before, and it now occurred to me that a boiler could be constructed to take advantage of this principle differently from the usual manner. The idea was to take the products of combustion from a furnace situated below the body of a boiler, up to the top of a steam-generating chamber, where, spreading out among finely-divided water surfaces, they would part with their caloric, become heavier and descend, giving place to hotter air from the fire, meeting continually cooler surfaces, then leave the boiler where the feed water enters. Thus the products of combustion would leave the boiler when sufficiently reduced in temperature, and reach the outlet flue—exactly the reverse of the usual plan of circulation—in which they are lastly exposed to the hottest surfaces, and leave the boiler with greater speed the more heat they contain. If a boiler could be constructed to operate in this manner I thought the great problem would be solved, for by this means we could have absolute control of the caloric, it being only necessary to expose the products to a sufficient cooling surface in order to abstract it all.

I think I have designed such a boiler. It is of the water tube variety, and may be either upright or horizontal ; to use the first is preferable. An upright boiler of this form, twelve feet in diameter, with 2-inch tubes, four feet long, contains 4,000 square feet of heating surface. A blast under the grate is required. An upper flue is open when the fire is first started, but closed when it burns clear, at which time the lower one is partially opened, in order to throttle the exit of the gases and allow only the circulation above described.

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Many advantages, not at first apparent, are found to belong to this boiler. First, the grate surface need be no more than a tenth of what is usually allowed, the blast enabling a much deeper fire to be used in burning only one-half the coal now required for the same amount of work. Second, the blast will permit a much more perfect combustion to take place, thus consuming every particle of the fuel, while the construction and position of the furnace will prevent injury from the intense local heat. Third, the heat acting with the greatest energy near the surface of the water will produce the steam where it will have the least disturbing effect on the water. Fourth, the heated gases can be made to pass through the finest spaces without danger of spoiling the draft. Fifth, the coal can be regularly fed into the furnace without letting in cold air. This, in connection with the intense combustion insured by the blast will almost entirely prevent smoke, and tend to further economy. Sixth, the chimney need not be near so large in diameter as at present, and only high enough to carry off the gases. On the other hand, the plan has few objectionable features. The most important is, perhaps, the difficulty of managing an air-tight furnace. Better firemen will undoubtedly be required. A blast is inconvenient, but is indispensable. These objections, however, if the foregoing conclusions are sound, will sink into insignificance.

The main points to be settled are: First, is it true that so great a loss occurs from the cause stated? Second, will the proposed circulation of the heated products of combustion remove the evil? All else is of minor consequence. These are questions of the greatest importance to all who use and are interested in steam navigation, for it is justly conceded that if a boiler can be obtained that will utilize all the caloric produced in the furnace, steam will take the place of sails on every sea, thus inaugurating a new era in ocean navigation, and a profitable one to all connected therewith.

In this view of the matter, if the proposed change offers a reasonable hope of success, it is well worthy of consideration. I hope some of your many readers will give an opinion of its merits, that we may arrive nearer the truth, be the result favorable or unfavorable to my invention. J. S. Colvin.

Allegheny City, Pa.

[As our correspondent has stated, this is a most important question, but there are boilers in use in which the circulation of the heated products of combustion and the feed water is effected in the manner proposed. This is the case with the Dimpfel locomotive boiler. It is true, as stated, that the heated products of combustion in steamboat boilers generally leave the top of the chimney at a very high temperature, thus involving a great loss of heat. There is certainly wide scope for improvement in steam boilers and furnaces yet, so as to economize the heat. And, as has been suggested, this subject is far more worthy of attention than the expansion of steam, &c., as the loss of heat in furnaces is usually much greater than in cylinders. It must not be forgotten, however, that it is only by fair experiments that the value of any boiler can be determined.—Eds.

Hight of Vertical Jets of Water from Fire Engines, or Fountains.

A body falling in vacuum from the force of the earth's attraction, falls 16 feet in the first second, and at the end of the second it is falling at the rate of 32 feet per second; the velocity being constantly accelerated. If a flume or tank of water is pierced at its side, the water will issue with a velocity just equal to the velocity which a body falling from the level of the surface of the water would acquire when it reached the level of the orifice. If the jet is turned vertically upward it will rise in a vacuum just to the level of the surface of the water; but in the atmosphere the hight to which it rises is reduced by the resistance of the air. Small jets are reduced in hight more than large ones, and it is only by an elaborate series of experiments that the ratio between the theoretical hight of the jet due to its velocity, and the actual hight to which it rises in the atmosphere, can be ascertained. A German engineer has recently made such a series of experiments, and we translate the following account of them from Dingler's *Polytechnic Journal*:—

Until quite recently, the experiments made by the French philosophers, Mariotte and Bossut, over a hundred years ago, have been the sole guide for determining the hight of the jets of fountains or of fire engines. It is well known that the results obtained from these experiments have been insufficient, owing partly to the small pressures or heads employed, and partly to the poor instruments of that time. It is, therefore, of great importance to the scientific world that a comprehensive series of experiments have lately been made by a German engineer, Mr. Weisbach.

The following tables give the result from experiments made with two different mouthpieces. The first mouthpiece was $\frac{3}{8}$ inches in diameter, $5\frac{3}{4}$ inches long, and the convergence of its sides was $5\frac{3}{4}°$.

Head in feet.	*Hight of jet in feet.*	*Head in feet.*	*Hight of jet in feet.*
3	2,865	33	28,611
6	5,712	36	30,708
9	8,541	39	32,643
12	11,304	42	34,440
15	14,040	45	36,180
18	16,704	48	37,776
21	19,278	51	39,219
24	21,768	54	40,608
27	24,138	57	41,838
30	26,430	60	42,960

The second mouthpiece was $\frac{5}{8}$ inches diameter, $9\frac{5}{8}$ inches long.

Head in feet.	*Hight of jet in feet.*	*Head in feet.*	*Hight of jet in feet.*
3	2,844	33	30,338
6	5,700	36	32,724
9	8,559	39	35,022
12	11,424	42	37,254
15	14,250	45	39,420
18	17,082	48	41,424
21	19,845	51	43,299
24	22,560	54	45,090
27	25,218	57	46,740
30	27,810	60	48,360

The following are some of the results arrived at by M. Weisbach:—

1. The resistance of the air for small velocities of discharge of from 5 to 25 feet, or for jets of from 1 to 10 feet hight, is so small that the hight of the jet can be taken as equal to the hight corresponding to the velocity of discharge, without a perceptible error.

2. Under the same head or pressure the hight of the jet increases with the area or size of the orifice. The resistance of the air is smaller with thick than with thin jets; in order to obtain a greater hight, therefore, not only a greater pressure but also a larger orifice is required.

3. Under otherwise equal circumstances jets from circular orifices reach higher than jets from square or differently shaped orifices.

4. With equal velocity of discharge, and with the same area of the orifice jets discharged without contraction rise higher than those with contraction. The resistance of the air is greater with the former than with the latter. Under otherwise equal circumstances, and if the head or pressure is not very small, jets from small conoidal or conical and internally-rounded mouthpieces rise to a greater hight than jets from orifices in a thin plate.

5. With jets discharged from orifices in a thin plate, the coefficient, a, may be taken equal to 1, and the difference between j and h is perceptible only when the velocity of discharge exceeds several feet.

6. The hight of the jet, j, does not increase in a simple ratio to the theoretical hight, h, corresponding to the velocity; if h is not very large the hight of the jet is approximately

$$j = \frac{h}{a + bh + ch^2}$$

where a b c are coefficients, to be determined for each orifice by experiment.

California Sulphur and Alum.—At Coso, California, there is a peculiar volcanic district. There is no large district crater, but streams of sulphur pour forth from thousands of tubular openings. The sulphur congeals and is found hard in several places. Alum is also found in great abundance. It appears that as the sulphur congeals it throws out a coating of alum. These sulphur springs cover about two acres of ground. They are situated on the side of a volcanic hill, about 300 feet above the level of the plain, twenty miles south of Coso, and fifteen miles northeast of Little Owens's Lake.

Six immense mortars, cast at the Fort Pitt Foundry, Pittsburgh, were shipped from Philadelphia for the navy yard at Brooklyn. These mortars are three feet seven inches in diameter, and four feet six inches in length, and will throw a bombshell thirteen inches in diameter. Their weight is nearly two tuns.

Perennial Cotton.

R. C. Kendall, Esq., of Maryland, has been making great efforts for some time to introduce into the middle and perhaps other portions of the northern States of this country the cultivation of tree cotton. The cotton plant is divided by some naturalists into three species, by others into thirteen, and by others the several varieties are grouped into a single species. The species, whether one or many, are included in the genus *gossypium*, and they are generally classified in three divisions, herbaceous, shrub and tree cotton. That cultivated in the United States is the herbaceous, though even this forms a perfect woody fibre. It is in fact a little tree which dies in the fall or is killed by the winter. The shrub cotton resembles a currant bush in size, and the tree cotton grows to the hight of 15 or 20 feet, living 8 or 10 years.

Mr. Kendall says that the tree cotton produces the best quality of any and three or four times the quantity to the acre of any other variety. He thinks also that it will grow in any latitude south of New York, and perhaps much farther north. He has issued a pamphlet on the subject, which is published by Mapes & Lockwood, 23 Courtland street New York. We make the following extracts:—

Mr. Kendall's first sight of the cotton tree.

Several years ago, while an employé in the Patent Office, I received and accepted a tempting offer from a Chilian gentleman of wealth, Senor Alsogara, to conduct certain matters on his estates. One holiday morning, not very long after my arrival at my temporary South American home, I set out on horseback along the course of a modest little river, called the Chipura, and forming the boundary between semi-civilization, and the territory of the Ypurian savages. Resolved to explore as much of my patron's domain as the brief May day would allow, I pushed briskly forward over the already frozen ground, covered fetlock deep with newly fallen snow, following the windings of the stream, whose ledgy banks of dark rock, generally thrust back, as it were, by alluvial bottoms from one to three hundred yards distant, indicated that the Chipura had one day been a river of ten times its present volume. After a ride of some two hours, in doubling an abrupt turn where the rocks approached very near the water, I came suddenly into full view of an object some two hundred yards distant, which presented the most magnificent spectacle I had ever seen—a perfect cone, or pyramid of pure, brilliant snow, elevated at its base perhaps seven feet from the ground, upon a shaft of whitish bronze; the whole structure cut clear and sharp against the dark wall of rock in the back ground. I had in northern countries, after a calm fall of snow, seen many a white pyramid, having an internal structure of pine or spruce, but knowing that in the present instance the snow had fallen during a violent gale, and observing that none of the pines about me bore any traces of it upon their branches, I rode forward in semi-bewilderment, to investigate the phenomenon.

It resolved itself, as I drew near, into a most perfect specimen of the *Gossypium Arboreum*, the perennial cotton tree. Its foliage had long been shed, but the pods remained, having fully burst, and turned out their spotless samples in almost perfect roses, covering the entire structure with a dense mass of spotless, glossy cotton. I had often seen and examined indefferent specimens of the perennial cotton shrub, but I had never seen anything even approaching in perfection that solitary tree.

The remainder of that, and many a saint day thereafter, was devoted to intimate companionship with, and diligent study of the habits, peculiarities and general economy of the beautiful *solitaire* of the Chipura.

Where it will grow.

Certain it is, however, that I found the finest specimens of the tree, bearing cotton of the longest staple and whitest, finest fiber, in a region where the snow lies three months out of the twelve; where the vicissitudes of climate are greater than they are in New England; and where not only the natives, but the furred animals, sometimes freeze to death. On the Atlantic side, the Gossypium Arboreum grows spontaneously and entirely hardy, as high as the parallel of 42°. That the tree readily adapts itself to all reasonable and very many unreasonable conditions of soil and climate, is conclusively proven by the fact of my having found it growing bravely at an altitude very nearly approaching the snow-line, on the eastern slope of the Bolivian Andes, in a soil as red with peroxide of iron as a well-burnt brick, and almost as hard. In the Desert of Alcamaya, I found it growing most determinedly in a bed of volcanic scoria, where never a drop of rain falls. In the vicinity of Arica and Tacna, in Peru, it thrives and produces cotton, growing in a waste of arid, burning sand. In the delta of the Guayaquil, it flourishes in an eternal quagmire; and on the eastern slope of San Gauy it clings to the bare calcareous rock, and lives. Everywhere in the low countries of the tropical regions, both the tree and staple degenerate; the former, in all cases, into a shrub, of from nine to twelve years duration; the latter always into a coarser, shorter, and under many conditions, into a meterial of no commercial value. In Peru, however, there are a few localities in which the tree cotton grows spontaneously, giving better results than shown by the general rule in a similar climate. In the valley of the Chira, latitude of 3° south, there has been, ever since 1851, an annual produce of perennial cotton, of six thousand bales, of one hundred and fifty pounds each, mostly of spontaneous growth; and any time during the past six years, worth in the port of Paita, whence it is shipped to England, sixteen dollars per hundred pounds—evidence conclusive that it is better than the best Louisiana.

Of 17,316 persons employed in the construction o the Roman railways, 6,781 are women, who assist the masons.

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The Preservation of Stone.

[From the Chemical News.]

No one who has critically examined the various projects for hardening and protecting stone, which have during the last few years been made public, can have failed to remark the great importance which, in the majority of instances, is attached to the action of silica. Thus in reviewing the processes submitted to the Decay of Stone Committee, among the eleven proposals which have already been under consideration, no less than seven depend for their efficacy upon the action of this very substance under various conditions of employment. Advantage is taken of the mutual decomposition exerted between certain silicious compounds applied, and the materials constituting the building stone itself; or, otherwise, systems are founded upon the production of compounds from an alkaline silicate, and a soluble earthy salt successively applied. The known properties of silica and of the class of silicates have, no doubt, powerfully contributed to the formation and establishment of this opinion. The facility and cheapness with which they can be manufactured on the large scale, their inalterability under trying atmospheric influences, their all but complete indifference to energetic chemical reagents—all point to silica as the one fit material upon which the ingenuity and experimental resources of our chemists and practical men may be expended with the greatest promise of success. Let only a sufficient amount of silica be compelled to enter and occupy the pores of the stone and incrust all the exposed surfaces; let it be employed in a state of hydration or other suitable form in which it may gradually combine with the earthy constituents it there meets, and with its action unfettered by saline impurities the presence of which tend often to interfere mechanically with its successful employment and the strong presumption is that the Houses of Parliament will endure, so far as the stone is concerned, as long as the Pyramids.

The difficulty which besets many of the processes of silification is, that along with the needful silica, so much superfluous, and indeed, injurious matter is introduced that the valuable qualities of the silicaare in a great measure counteracted; the disintegration of the stone sometimes caused actually by the efflorescence of these extraneous substances, and the porous character necessarily induced as the consequence of the gradual removal of the soluble salts in juxtaposition with the silica, almost undoing the binding and hardening action of this valuable material. From this train of reasoning, it became evident that if hydrated silica could but be deposited in the pores of a limestone or a dolomite, without the assistance of potash or soda as a vehicle, and there be left slowly to enter into a chemieal union with the earthy bases of the stone, its action commencing unimpaired by the presence of extraneous salts, and its future efficacy undiminished by the progress of their removal—that if this could be accomplished there would be a far greater chance of ultimate success than has been offered by any plan yet made public.

It is well known that silica can, by appropriate means, be obtained in the form of a pure aqueous solution, and it was to this liquid that we accordingly directed our attention. This solution can be made in several ways:—

1. By dissolving sulphide of silicium in water, when sulphureted hydrogen is given off, and the silica remains completely dissolved, and in such quantity that the liquid gelatinizes when an attempt is made to evaporate it.

2. By precipitating silica in the gelatinous state from an alkaline silicate, by means of acetic or other weak acid, and after well washing, heating it for some time under pressure, with a small quantity of water in a closed vessel. A liquid is thus obtained which gelatinizes on addition of a saline solution.

3. By passing gaseous fluoride of silicium over crystallized boracic acid, and separating the hydrofluoric and boracic acids by digestion with a large excess of ammonia, a hydrate of silica remains, which, when well washed from the above acids, is very soluble in water. This solution gives no precipitate when boiled, but leaves silica as an insoluble powder on evaporation.

4. By the beautiful method recently pointed out by Professor Graham, in which advantage is taken of the new means of separating bodies by *dialysis*. A solution of silicate of soda, supersaturated with hydrochloric acid, is placed on one side of a parchment paper septum, pure water being on the other side; in a few days the hydrochloric acid and chloride of sodium will be found to have completely passed through the diaphragm, leaving the silica in aqueous solution, and so pure that acid nitrate of silver fails to detect chlorine in the liquid. This solution remains fluid for some days, but it ultimately gelatinizes. We have generally adopted this last plan of preparing the aqueous solution of silica, although a stronger solution is obtained by the method first given.

When a pure aqueous solution of silicic acid prepared as above is allowed to soak into the pores of chalk or dolomite, a process of hardening rapidly occurs, which goes on increasing for several days, whilst owing to its considerable depth of penetration, and to there being no soluble or efflorescent compounds to be removed, there is every probability that this hard silicious impregnation will afford permanent protection to the stone. We are now actively engaged in investigating the nature of the action which takes place, and already several curious and important results have been made out, from which we are led to anticipate that our experiments will ultimately be rewarded with complete success.

The Constitution of the Sun.

Further researches in the spectrum of artificial lights are showing that MM. Bunsen and Kirchoff were too hasty in their conclusions in regard to the substances which enter into the composition of the sun. It is found that the bright lines in the spectrum of a burning body vary with the temperature of the flame in which the body is burned. Professor Frankland, in a letter to Dr. Tyndall, published in the last number of the *Philosophical Magazine*, says:—

I have just made some further experiments on the lithium spectrum, and they conclusively prove that the appearance of the blue line entirely depends upon temperature. The spectrum of chloride of lithium ignited in a Bunsen's burner flame does not disclose the faintest trace of the blue line. Replace the Bunsen's burner by a jet of hydrogen—the temperature of which is higher than that of the Bunsen's burner—and the blue line appears, faint, it is true, but sharp and quite unmistakable. If oxygen be now slowly turned into the jet, the brilliancy of the blue line increases until the temperature of the flame rises high enough to fuse the platinum, and thus puts an end to the experiment.

As the lines of spectra vary with the temperature of the burning bodies, and as the temperature of the sun is very much higher than any which we can produce, it is impossible to tell what substances do produce the lines of the solar spectrum.

The Life Work of Agassiz.

Professor Agassiz, in an article in the *Atlantic Monthly*, makes the following statement of the result of his life's study:—

The education of a naturalist, now, consists chiefly in learning how to compare. If he have any power of generalization, when he has collected his facts, this habit of mental comparison will lead him up to principles, to the great laws of combination. Itmustnot discourage us that the process is a slow and laborious one, and the results of one lifetime after all very small. It might seem invidious, were I to show here how small is the sum total of the work accomplished even by the great exceptional men, whose names are known throughout the civilized world. But I may at least be permitted to speak of my own efforts, and to sum up in the fewest words the result of my life's work. I have devoted my whole life to the study of nature, and yet a single sentence may express all that I have done. I have shown that there is a correspondence between the succession of fishes in geological times and the different stages of their growth in the egg—this is all. It chanced to be a result that was found to apply to other groups and has led to other conclusions of a like nature. But, such as it is, it has been reached by this system of comparison, which, though I speak of it now in its application to the study of natural history, is equally important in every other branch of knowledge.

New Discovery by Spectral Analysis.—It is stated in all the works on chemistry that the blue flame of a candle, alcohol, illuminating gas, paper, &c., is caused by the burning of the oxide of carbon; but Mr. Moren in a letter to the Abbé Moigno, editor of *Cosmos*, says that it is due to the combustion of the protocarbide of hydrogen. He remarks:—"Spectral analysis proves this in an incontestible manner."

Patent for Turning Irregular Forms.—As several correspondents have recently made inquiries as to the period when the extended patent of the ingenious Thomas Blanchard, of Boston, expires, we answer, for all concerned, that it was extended for fourteen years by special act of Congress, January 20, 1848, and will therefore expire January 20, 1862.

Saving in Gas Bills.

It has long been known that the light of illuminating gas may be considerably increased by mixing with the gas the vapor of naphtha, one of the volatile hydrocarbons resulting from the destructive distillation of coal. As this vapor condenses at low temperatures it cannot be carried through pipes from the gas works, but must be mixed with the gas in the vicinity of the burner. It will be remembered that we recently illustrated an invention for which a patent is held by the Carbonized Gas Company, 476½ Broadway, in this city, by which the reservoir of naphtha is introduced into the midst of the chandelier.

In the last number of the *Chemical News* we find the report of W. Haywood, the engineer for the Commissioners of Sewers, of an experiment made in London to test the advantage of applying this mode of increasing light to the street lanterns. Moorgate street was selected for the experiment. Six lanterns on one side were provided with the common batswing burners, burning 5 cubic feet of gas per hour, and six upon the other side of the street were fitted with 2½ feet burners and with reservoirs of naphtha. The experiment lasted 30 days. The District Inspector of the Commission, who saw the lights nightly, reports his opinion that the light on both sides was perfectly equal. Mr. Haywood thinks that the light from the 2½ feet burners was inferior, though very slightly so, to that from the 5 feet burners. He comes to the conclusion that about 3 feet of the carbonized gas is about equal to 5 feet not carbonized. As the naphtha will not evaporate in cold weather, the apparatus will not operate out of doors in the winter, but Mr. Haywood thinks that it will save at least $5 to each street lantern during the summer months.

Some Facts in Relation to Light.

It has long been supposed that the chemical effect of light was confined to those rays which are refracted most—the violet end of the spectrum. At the last meeting of the American Photographical Society, the President, Professor Draper, remarked in the course of a discussion:—"It is a well established fact that all parts of the solar spectrum have an action on the photographic plate." And he exhibited a daguerreotype plate on which was an image of the spectrum complete in all its points. The action of the red and yellow, however, seemed to be of a reversed order from that of the indigo. The daguerreotype was one of two made in 1841; its mate was presented to Sir John Herschel.

In the Paris correspondence of the *Photographic News* we find the following statement:—

M. Baudrimont gives, as the result of his researches upon the chemical action of solar light, that—contrary to the opinion generally entertained—chemical rays exist throughout the whole extent of the solar spectrum. The facts observed also lead to the belief, that each species of colored light possesses a special action, and that each may be completely inert with regard to certain matters; but, on the contrary, very energetic with respect to others. Another series of experiments enables M. Baudrimont to establish the influence of the various colors of the spectrum upon the development of vegetation. Thus, for instance, no colored light permits vegetables to go through all the phases of their evolutions; none of them have flowered or fructified. Violet colored light is positively injurious to plants: they absolutely require white light.

Power of a Horse's Scent.—A correspondent of the *Homestead* says:—"There is one perception that a horse possesses, that but little attention has been paid to, and that is the power of scent. With some horses it is as acute as with the dog, and for the benefit of those who have to drive nights, such as physicians and others, this knowledge is invaluable. I never knew it to fail, and I have ridden hundreds of miles dark nights; and, in consideration of this power of scent, this is my simple advice: never check your horse at nights, but give him a free head, and you may rest assured that he will never get off the road, and will carry you expeditiously and safe. In regard to the power of scent in a horse, I once knew one of a pair that was stolen, and recovered mainly by the track being made out by his mate, and that after he had been absent six or eight hours."

The California *Farmer* states that the cultivation of beet-root sugar has been successfully tried in California. Large quantities of such sugar are now annually imported from France, but it is believed that the climate of California is well adapted for the sugar beet, and that it may be cultivated with profit.

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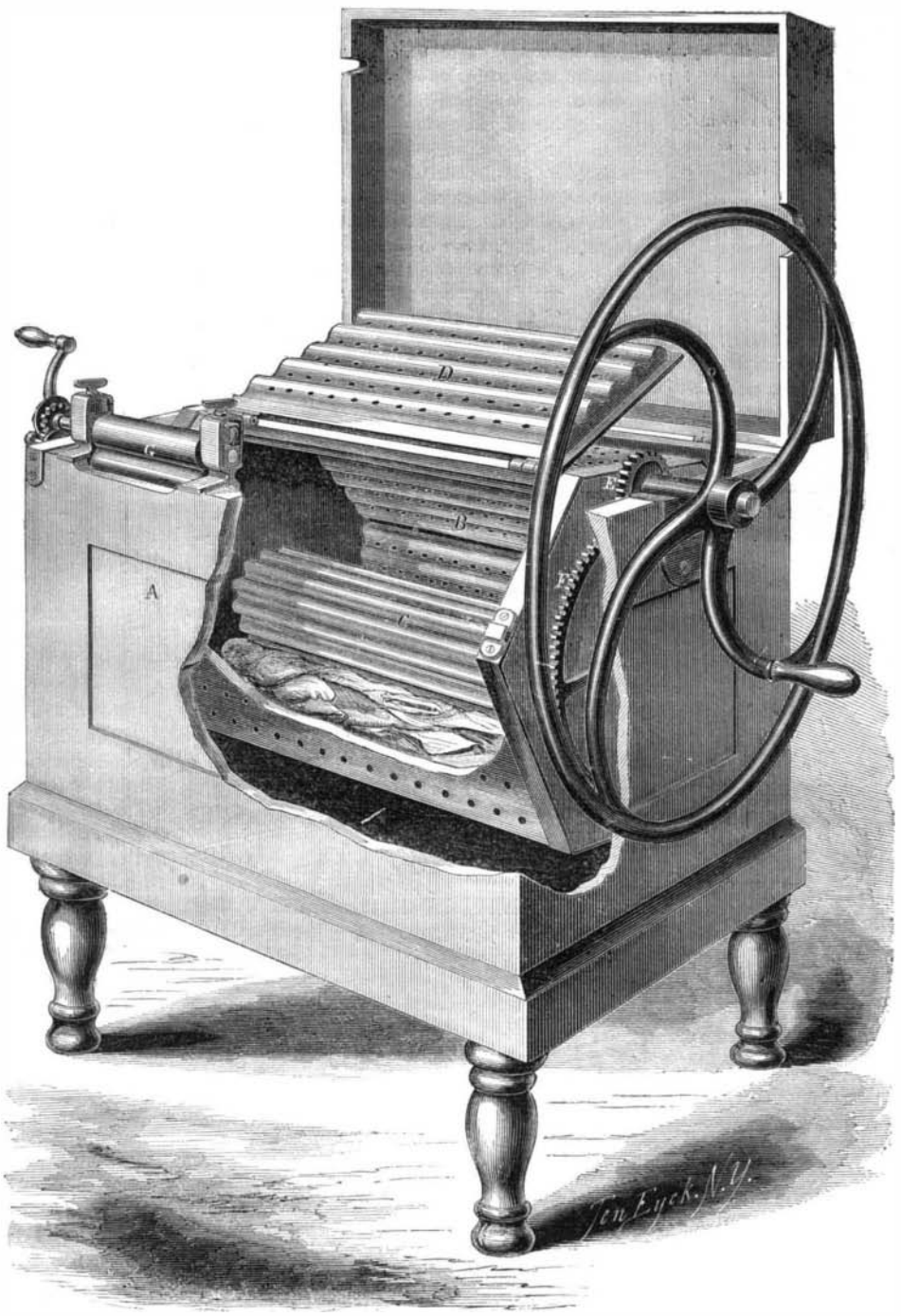
An Improved Washing Machine and Wringer.

Clean clothing is almost as essential to the health of man as fresh air, good food and water. The sanitary condition of our soldiers is justly occupying a great deal of public attention, and we have heard it asserted on several occasions by persons who had recently visited the camps on the Potomac, that efficient, simple and durable washing machines would be among the most beneficial appliances that could be supplied to our armies. We have no doubt of the correctness of such statements, because all history is conclusive respecting the evils resulting from unclean clothing in hospitals and among soldiers on "the tented field." In the early part of the Crimean war the English hospitals became pest-houses of disease.—Simple wounds festered and became fatal, and one of the great sources of this arose from filthy garments and bed-clothing, owing to the inefficient facilities for washing them. It was the same in the hospitals at St. Louis until recently, as we have been assured by a resident of that city. It is also well known that soldiers in camp are very much subject to cutaneous diseases which are in a great measure thus caused.

The common mode o. washing clothes in the army by rubbing and scrubbing is a clumsy, tedious and expensive operation; therefore good washing machines for army purposes must be beneficial agencies. The accompanying engraving illustrates a simple, strong and durable machine for this purpose, as well as for the common purposes for which such machines are required. It is represented open to show the interior, and it consists of an outer box, A, resembling a common family refrigerator. It is lined inside with zinc and is water-tight. B represents a hexagonal hollow box perforated with holes and fluted inside, as shown by its lid, D. This box holds the clothes, it is hung on journals, has a loose fluted roller, C, rolling with the clothes inside, and it is rotated by the crank handle of the fly-wheel through the gear wheels, E F, so as to dash among the suds that are placed in the outer box. G is a clothes wringer composed of two accommodating pressure rollers covered with india rubber. When the clothes are washed in the hollow hexagonal box, B, they are placed, piece after piece, between these rollers, and by turning the handle, the clothes are carried through, the water pressed out of them, and they drop into a basket situated underneath.



SMITH'S WASHING MACHINE AND WRINGER.

A certain quantity of hot suds is poured into the outer box, then some of the batch of clothes to be washed are placed in the box, B; then the loose fluted roller, C, is put in, and afterward the rest of the clothes, leaving the roller in the middle of them. The lid of the hexagonal box is then shut down and fastened with a bolt, and also the lid of the outer box, which has a deep rim upon it. The box inside is then rotated by the fly-wheel handle for about from fifteen to twenty minutes, which is about a sufficient length of time for washing a batch of colored clothes requiring only one course of suds. The form of the box makes the clothes roll over and drop down from one side to another, as it rotates, similar in its action to the old dash wheel, while the roller exerts a gentle padding action, squeezing the dirt through the perforations of the box.

Such is a description of the construction, arrangement and operations of this washing machine. We have examined several in operation at No. 111 East Houston street, this city, where they are made of various sizes. A No. 4 machine, which is about 3½ feet long and 2 feet deep, is capable of washing 47 soldiers' shirts in fifteen minutes, and 76 white cotton or linen shirts in twenty minutes. White linen articles require two waters in order to cleanse them thoroughly. After passing through the suds they are rinsed with cold water, in the same way they have been dashed in the suds. In hospitals, regiments, or any institution where a great many clothes have to be washed, one machine should be used for washing and another for rinsing. Blankets and pantaloons should be washed nearly as often as shirts. These machines may be heated with steam, or when this cannot be obtained, hot suds boiled in a kettle and poured in will answer just as well. The price of these machines complete, with wringer, ranges from $20 to $100, according to size and style of finish. They can be driven by hand, or by horse, water or steam power.

The patentee is H. E. Smith, from whom further information may be obtained at 111 East Houston street, New York, or by mail.

Rolling Gun Barrels.

On page 372 of our last volume (V. new series) we illustrated the method of rolling gun barrels for which a patent had been granted to W. H. Burton, formerly of Harper's Ferry. We have received two communications claiming the invention as English. One says it was invented by Henry Osborn, of Bordsley, near Birmingham, in 1817, and the other that it was invented by a Mr. Russel, of the same place. Probably they are right.

Another correspondent—Mr. William S. Hudson—says "the rollers used at the Springfield Armory are of English manufacture. They have two sets, and one of these was recently imported from England. I do not know why they were imported, as I have no doubt they could be made here."—Our correspondent is right; such rollers can be made here, we believe, as well as in Europe.

LARGE PROFITS ON SMALL PATENTS.—A VALUABLE SPRING.—In 1858, E. F. Jones (colonel of the renowned Massachusetts Sixth Regiment which was assailed by the mob while passing through Baltimore last April) obtained a patent for securing the glass chimneys of coal-oil and other lamps by a small bent flat spring, as a substitute for the old screw fastener, and since then the little spring has been pouring forth a perfect stream of gold to the inventor. Mr. Edward Miller, manufacturer of lamps, burners, &c., Meriden, Conn., has informed us that he alone pays the patentee $300 per month for the license to apply this simple spring fastener to the lamp burners which he makes, and there is another firm in Boston that pays an equal sum for a similar privilege. Mr. Miller makes about 200 dozen burners per day; there are other manufacturers who make upon a smaller scale, and pay proportionally for their licenses.

THE LONDON UNDERGROUND RAILWAY.—The London *Engineer* says:—From Paddington to Victoria street station the line is 3½ miles long, having stations at Paddington, Edgware road, Baker street, Portland road, Euston square, King's cross and Victoria street. From west to east the average slope downward of the whole line is about 1 foot in 300 feet, though, after entering the city, it again rises, but there is no steeper gradient than 1 in 100. Its greatest curve is of 200 yards radius, and its greatest depth from the ground above to the rails is 54 feet; and there are not more than 1,200 yards of straight line throughout. The span of the arch of the tunnel is 28½ feet, its form is elliptical, and its hight 17 feet, except in the parts where there is great superincumbent pressure, when the form of the arch is altered to give it greater strength, and to take the crown to a hight of 19 feet.

CARBONATE of lead (a poison) is, it is now asserted, efficacious in cases of consumption. Workers in lead, we are told, are never consumptive.

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VOL. VI. NO. 2.....[NEW SERIES.].....*Eighteenth Year.*

NEW YORK, SATURDAY, JANUARY 11, 1862.

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DESTRUCTIVE FIRE SHELLS.

While on a visit to the Washington Navy Yard, a few days since, we were shown some shells that were charged with a peculiarly destructive liquid. The person that showed them to us could give no account of their peculiarity, but we have since learned that some experiments were recently made at the navy yard with an apparatus for the ejection of liquid fire which to all intents and purposes is the famed Greek Fire revived, the secret of which has been lost. The chemical composition of this fire may not be the same, but its effects are as terrible as those attributed to the inextinguishable fire of the Greeks. The composition and the apparatus for ejecting it are the inventions of Prof. B. F. Greenough, of Boston, who, though for many years nearly blind, has pursued his chemical investigations with unabated zeal, until he has produced what promises to be a terrible auxiliary in warfare.

The experiments were made under the direction of a Board, consisting of Capt. G. V. Fox, Assistant Secretary of the Navy, Capt. Dahlgren, Capt. Wainwright and Lieut. Badger. A target was erected upon a platform fifty feet long by thirty feet wide, the target being made of solid oak timber three feet in thickness. The fluid was ejected in an inert state from a pipe of 3-16ths inch diameter, and was thrown some thirty to fifty yards before it reached the target. At a distance of several feet from the nozzle the fluid ignited, expanding to a diameter of two feet, with an intense combustion, which covered the target and the platform with liquid fire. The fire was apparently inextinguishable, burning readily on the water, and consuming the target. It emitted dense fumes and smoke which darkened the atmosphere and would have suffocated any human being who had come within its influence. The experiment was quite successful.

Extravagant accounts have come down to us respecting the Greek Fire. It was said to be unextinguishable in water, and was terrific as the flames of pandemonium. Such descriptions have been principally derived from panic-stricken foes—frantic Turks and others, who were more frightened than hurt by the Greek Fire—ships which were saturated with turpentine and sulphur.

Several incendiary and asphyxiating shells have been invented for the purpose of scattering "liquid fire" and noxious fumes around the space where they explode. One of this character was exhibited to us several weeks since by Lieut. Matthieson, of the 79th Regiment, N. Y. S. M. It is a double shell made in one casting, the inner being united to the outer shell by braces, leaving spaces between the two. One was charged with a combustible fluid, and the other with a bursting charge and shrapnell. It was designed for a bombshell to fire dry underbrush when the leaves lay thick on the ground, for the purpose of dislodging an enemy hid under the cover of thick woods.

Those who suppose that either coal oil, petroleum, naphtha or benzole, is suitable for producing incendiary bombshells are mistaken. The fluid capable of performing such an office requires to be inflammable in the atmosphere at common temperatures, which is not the case with petroleum.

The first explosive shells employed in war were grenades and were thrown by hand, a chosen body of strong soldiers called *grenadiers* being selected to use them. The name "grenadiers" is still retained for companies of big soldiers, but their old "occupation is gone."

The first patent taken out for firing bombshells horizontally from guns was by Isaac D. La Chaumette, in England, in 1721. He used a breech-loading cannon (not a mortar), and the shell was ignited by a time fuse. Percussion shells, which explode when they strike, were patented in 1829, by John Tucker. His shells contained a principle which has lately been claimed as new. It contained a hollow tube in which was a loose sliding bar or striker, and at one end of the tube the fulminating powder was placed communicating with the bursting charge. When the shell was fired, the striking bar was situated at the end of the tube opposite the percussion powder, but when it struck an object the sliding bar darted forward to the fulminating priming and ignited the charge. Elongated percussion shells have been patented to strike on their points and explode percussion caps that communicated with the charge inside, but the sliding striker shell is allowed to be the most reliable. Shrapnell shells are formed by charging the inside of common bombshells with balls, then filling the interstices with a brittle substance and the powder. The inventor was Henry Shrapnell, who obtained a patent in 1834. Quite a number of patents have been taken out for making shells with wings to give them a spinning motion when fired from smooth-bored guns.

During the Crimean war the number of patents taken out in England for destructive missiles was astonishing. A few of these deserve consideration. In 1855, J. W. F. Packman patented a shell charged with explosive gases and ferrocyanide of potassum in powder—a powerful poison. In the same year J. Macintosh secured a patent for charging shells with coal tar and naphtha to produce suffocating vapors when it exploded. About the same time Henry Disney applied for a patent for an incendiary shell stated to be of a peculiarly destructive character, but the patent was refused and the invention suppressed for the benefit of the government. Since then it has been stated that this shell was filled with a substance capable of spontaneous combustion when it exploded, and it was, therefore, the first practical incendiary shell. In 1851, J. Macintosh obtained a second patent for an incendiary shell filled with fire balls. These were made by mixing gunpowder with india rubber in solution, spreading this compound on cloth, and coating it with a powder composed of sulphur, steel filings and chlorate of potash. The cloth so made was cut into strips and formed into balls for charging shells. These inflammable balls ignite when the shell explodes, and they set fire to all combustible objects with which they come in contact. We have been informed that Disney's shell was charged with naphtha and phosphorus, which produces a liquid that will take fire spontaneously, and is, therefore, suitable for incendiary shells.

In the published accounts which we have read of the attack on Fort Pickens, it is stated that very few of the shells thrown into the fort exploded, while most of those sent into Pensacola from the fort were effective and very destructive. In explanation of this, it is said that Gen. Bragg's shells were made in Europe, but those used in Fort Pickens were Hubbell's American shells, manufactured at the Washington Navy Yard.

WATER GLASS.

The last number of *Silliman's Journal* contains a long article on water glass (silicate of soda), by J. M. Ordway, in which he relates his experience respecting its adaptability to many useful purposes, and that it is of permanent value in many of the arts. He states that a strong solution of this silicate of soda forms a good colorless cement for glass, porcelain and stone, but it is not suitable for cementing wood, nor is it equal to gum, or flour paste for paper. When a solution of silicate of soda is mixed with clay and sand, it is excellent as a substitute for mortar in setting fire bricks, because it undergoes partial fusion by heat in a furnace and thus it makes very tight and firm joints. Fibrous asbestos moistened with the silicate of soda makes superior packing for the joints of apparatuses exposed to hot acid vapors. Silicate of soda is also well adapted for fixing various pigments used in painting and this is the use to which it has been most recently applied in Europe. When mixed with light colors and applied to wood, it softens the surface of the latter, and is therefore not well adapted for primary coats in painting wood. As it is also devoid of elasticity, it is not suitable for painting in situations where the surfaces are liable to shrink. For painting out-door work, a mixture of zinc white, chalk and silicate of soda is far superior to common lime washes.

One great defect of water glass for coating the surfaces of wood, stone, &c., is its liability to become dull on the surface by the action of the atmosphere. When it is laid on at first and becomes dry, it presents a beautiful smooth and glossy surface, but after exposure for some days, it loses its luster by absorbing carbonic acid from the atmosphere. But although it loses its lustre it acquires another property, and its most valuable one, for applying it to surfaces to render them water and fire-proof. When first applied, it is liable to be washed off with rain, but the absorption of carbonic acid after several days' exposure converts it into an insoluble substance when it is safe from moisture and rain. It is therefore very suitable as a paint for stone, brick, or mortar surfaces which are unyielding. The best way of applying the silicate of soda as a paint is to put it on in several thin coats, and allow several days to elapse between each application. There are several paints with which it is unfit for mixing, such as white lead and Prussian blue, but zinc white, chalk, yellow ocher, sulphate of baryta, cadmium yellow, venetian red, green oxide of chrome, umber, lampblack and ultramarine will mix with it and make good paint. These colors should be ground up with the water glass, and before applying them the surface to be painted should receive a primary coat of pure silicate twenty-four hours before the paint is put on. A good silicate of soda, should be bright and transparent. A great deal of

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that which has been sold has been mixed with foreign substances and was unfit for painting purposes.

Walls plastered with lime mortar may be rendered very hard, close and smooth, as well as capable of being washed, by applying one or two coats of silicate either alone, or mixed with chalk. Kuhlman, the German artist, recommends a mixture of water glass with ivory black for writing ink, and asserts that it is capable of resisting destructive agents used for erasing common inks. A mixture of water glass and peroxide of manganese is recommended to be applied to cooking stoves when they are red hot, as it is said to make a good blacking not as liable to burn off as common black lead. The silicate of soda is now used as an economical detergent agent in the dunging operations which calico fabrics undergo in preparation for madder colors.

TYPE-SETTING BY MACHINERY.

We have alluded to this subject in previous volumes of the Scientific American, noting from time to time the gradual progress made in introducing machinery into the most important department of the printing office—the composing room. It is here that many busy fingers are employed in picking up the little type, and making what we may call a most beautiful copy, in metal, of the irregular and almost illegible manuscript, from which we may print off thousands of copies in a single hour. The labor of composition is irksome, much of it being done when the world is fast asleep, and is far greater in amount than any other labor of the printer, consequently any considerable advance in this department will be an advance indeed, and must increase the usefulness of the art many fold.

"But can type be set by machinery?" asks some doubting friend. A similar question was asked respecting the steam press; and it was long supposed that human ingenuity could not devise a substitute for the peculiar jerk of the typefounder, which causes the metal to enter every little interstice of the matrix. All this has been accomplished, however. But while every other branch of the printing business has made rapid strides, this one labor of composition remains almost as it was left by Guttenberg four hundred years ago. It is no ordinary problem to construct a machine that shall answer all the various conditions required in the practical routine of a printing office with so many different kinds of work, different sizes of type, different characters and so many type of each character. And when we consider that it is a combined mental and mechanical operation, we confess that at first sight it seems like attempting the work of brains, but its real object is to facilitate brain labor by enabling the mental powers to work to the best possible advantage.

We alluded a year or two since to a machine then in progress by Charles W. Felt, of Salem, Mass. Mr. Felt has built some three or four of his machines as experiments, and has one of them now nearly completed of the pattern adopted for practical use. He has recently returned from England with orders for some of his machines, and has taken measures to secure European patents through the Scientific American Agency. This invention is much more comprehensive than any other for this purpose that has been brought to public notice. All previous inventions have included only the principal characters, the rest being put in by hand, while this machine not only contains all the characters that may be desired, but a due proportion of each, as such letters as *q*, *x* and *z*, are of very rare occurrence, while the letter *e* is found, by a very complete investigation, to average 12.57 per cent, or almost precisely one-eighth. There is also a method of "justifying" the lines, which is done by the machine, one line being "justified" while the next line is being composed, and a record may be made of the composition upon the principle of the Jacquard loom, by which the work may be distributed or reset by the machine at any future time and in any kind of type. These various features may be so arranged that they may be used or not as may seem desirable, which gives the machine a ready adaptation to the great bulk of the various kinds of work.

The machine is driven by steam or foot power, and controlled by the operator through a key-board, but the arrangement is, as far as may be, in close analogy with the present method of setting type. When it is desired to change the size of type, the cases are taken out of the machine and others put in their place, just as the cases are changed at present on the ordinary stands. The cases are of metal, and the types are arranged in columns, and are taken from the case by a small pair of steel pincers corresponding with the fingers, and gathered into a stick which holds but a single line, and has a little bell attached which gives the operator warning when he approaches the end of the line. When the line is finished the operator touches the justifying key, which throws the line out of the stick, and the line is justified, and leaded if desired, and fed out upon a galley ready for the press.

The machine both composes and distributes, and as one of these operations is but the reverse of the other, so in the machine, if the motion be communicated in one direction, it will set type, while, if communicated in the opposite direction, it will distribute. The type are used just as they come from the foundry. The arrangement of the letters on the keyboard is similar to that of the ordinary case, so that the compositor has only to use his present knowledge and a little more about the machine to accomplish four or five times his present labor and with greater ease. The keyboard, too, is quite simple, having only separate keys for each of the smaller letters, and a single key for the capitals, another for the small caps, &c., so that only thirty or forty keys would be needed for two or three hundred characters.

It is needless to enlarge upon the advantages which will flow from the general introduction of such an improvement in the art of printing, which has been justly styled "the art preservative of all arts," and we are glad to know that it will be pushed forward at home or abroad notwithstanding the calamities of war sometimes place a strong embargo upon such enterprises.

THE BROWN STONE OF OUR HOUSES CRUMBLING TO PIECES.

The people of England are earnestly discussing a subject which will probably, within a very few years, excite the greatest interest in this city. We allude to the decay of building stone. It is known that the new houses of Parliament in London were hardly finished before the stone of which they were constructed began to crumble to pieces. A committee of learned men was appointed to investigate the cause of the decay and to examine the various plans that were suggested for preventing it.

The material is a magnesian limestone, which has proved to be durable in other parts of England, but is destroyed by the peculiar atmosphere of London. The committee found the decay most rapid in the lower parts of the building and those which were most sheltered from the light and air. In regard to the various plans offered for preventing the decay some comprehensive remarks from the *Chemical News* will be found upon another page.

If any of our citizens will direct their observations to the subject they will see that the sandstones, so extensively used in the buildings of New York, are going the way of the British houses of Parliament. Even the stone so carefully selected for Trinity Church is rapidly disintegrating, and throughout the city steps, posts and sills, as well as the stone of our brown-stone houses are peeling off scales which fall to the earth a mass of rubbish. Some good mineralogists say that as a general rule sandstone will not endure exposure to the weather more than thirty years.

It will be seen that the editor of the *Chemical News* has strong hopes that his process for preserving stone will prove successful, but the committee speak very discouragingly upon this point. At all events, until some preserving process shall be proved to be successful, it would be well for those of our capitalists who wish to erect permanent structures to use a more durable material than our perishable sandstones.

General Rosecrans Among the Inventors.—In another column will be found an illustration of a lamp invented by the general who has made himself so illustrious by his brilliant operations in Western Virginia. M. Argand has secured a world-wide fame by the invention of his lamp, and it may be that the name of General Rosecrans will be more widely and more lastingly known as the author of this simple invention than as the able leader of armies and the winner of victories.

WHY DOES COKE KINDLE MORE QUICKLY THAN ANTHRACITE COAL?

Illuminating gas is made from bituminous coal. The coal is placed in small air-tight ovens or retorts, with furnaces underneath, and kept red hot for several hours. The gas passes off through a pipe provided for the purpose, leaving behind a mass of porous lumps, which are raked out into iron wheelbarrows, and cooled by sprinkling them with cold water. This is coke, and the gas companies, after using what they require in the furnaces under their retorts, sell the remainder to the citizens for fuel. It is the cleanest, pleasantest and cheapest fuel to be had in this market.

Coke is almost identical in composition with anthracite coal, being composed principally of carbon, but all who have used it are aware that a fire can be made far more quickly with it than with hard coal. This is owing wholly to the more porous structure of the coke. Carbon and oxygen will remain in contact with each other an indefinite period of time, at ordinary temperatures, without combining, but if they are heated to a high temperature and brought in contact they immediately combine, producing light, heat and all the phenomena of combustion. The lumps of anthracite coal being solid are good conductors of heat, and, consequently, when one side of a lump is heated the heat is rapidly conducted away, and diffused throughout the mass, rendering it impossible to heat one side of the lump to the burning temperature without heating the whole of the lump to the same point. Coke, on the other hand, is of a spongy structure, full of air cells, which make it a slow conductor of heat. Hence the heat which is applied to one side of a lump is not conducted away, and one side may be heated to the burning temperature while the other side is comparatively cool. A lump of coke, burning on one side, may be taken up in the fingers, but this is not the case with anthracite coal. In short, to kindle anthracite coal it is necessary to apply the heat a sufficient length of time to heat the pieces throughout their whole mass, while the pieces of coke require to be heated only upon one side.

FORESTS ON THE NORTH SIDES OF HILLS.

Dr. Stevens, in his last lecture on the geological history of North America, described, as will be seen in the report in our last issue, the great submergence of the continent after it had received nearly its present form. During this submergence, a cold ocean current swept over the land which was buried beneath the waters, from the north to the south, wearing away the rocks and carrying their *debris* upon their southern sides. Dr. Stevens stated that our most fertile soils are found in this drift.

At the close of the lecture Professor Mason, the President of the Association, remarked that several years since he happened to have a conversation with a man who had spent his life in buying and selling land, and the man told him that he very soon learned not to take up land upon the north side of a hill. Professor Mason said that his attention being thus called to the matter, he had made very extensive observations and inquiries which had fully confirmed the opinion of the speculator. He added, if any one who has occasion to ride from this city to Canada will observe, he will see that the lands are generally cleared for cultivation upon the south sides of the hills, while the forests are left standing upon the comparatively barren rocks on the north sides.

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VALUE OF INVENTIONS IN TIME OF WAR--WHAT THEY HAVE DONE FOR ENGLAND.

War is not necessarily destructive to all the arts of peace, or to the invention of new contrivances calculated to further develop our natural resources. It may greatly retard, or only slightly check, a nation's progress, according to its severity and continuation; but in the present enlightened era of the world, and as war is now conducted, it can never bring to a stand still a nation like our own, composed of a population of nineteen millions of loyal citizens. The war in which we are engaged may destroy much property already accumulated, private estates may be and have already been swept entirely away, but many of the ordinary industries will continue with their usual success, many more will be, and already have been, greatly enlarged in their operations, and what is of more importance than all, through the inventive faculties of our people, new industries will be discovered and new and other property will be created. It is true that war draws many men from their accustomed fields of labor. The farm, the workshop, the store, the college, all send forth their patriotic contributions to swell the armies of an independent people. More than this, when one man leaves an employment in order to engage in the battles of his country some proportion of the labor of other men is required for his support; then, instead of developing wealth, he becomes a consumer, and just in that proportion he is felt as a burden upon the state. But the era when physical power was the only, or even the chief, agency in the development of wealth has now passed away. We do not fill our factories now with a multitude of hands; we place a steam engine there, this turns the shafting in every part of the building, and drives machines that multiply in themseles the mere hand work of a thousand mechanics. Mind is much more effective than brute force. Brain is the best producer of the two. When one-third of a country's population is destroyed we cannot say that she has lost one-third of her productive power; we must first ascertain who have been taken away and who are still left.

The history of the last one hundred years will show that the world is much more indebted to the few than the many, and of these few a large proportion have been inventors. Peace is undoubtedly the period of the inventor's best prosperity; but in times of war, in spite of war's desolation, they have carried to the homes of the people, a new thrift and a new prosperity. In proof of this we have the encouraging fact that during the period of time extending from 1793 to 1816, when England was involved in her most expensive wars, that nation increased in wealth and prosperity in a greater ratio than ever before. And this was mainly due to a few inventions, and to a few prominent inventors. The English revenue, which in 1797 was only £23,126,000 increased steadily until it reached the sum of £72,210,000 in 1815. In 1797 the revenue from lands was only £3,000,000 and in 1715 it was £15,000,000. The total net aggregate amount of revenue from the accession of George III. to the end of that period, exceeded the prodigious sum (never before imagined) of £1,386,000,000; nor can we help remarking, though it is foreign from our subject, that this immense sum was mainly expended in endeavoring to enforce unjust laws in the American colonies, in upholding the dethroned house of Bourbon, and in fostering aristocracy.

And for this power of endurance, we have before said, England was mainly indebted to the genius of a few men, not statesmen, or bankers, or merchants, or noblemen, or churchmen, but simply inventors. At the beginning of this period, Robert Fulton was experimenting in France upon the application of steam to the propulsion of vessels through water. In 1806 he returned to this country and continued his experiments on a larger scale, and with what result the world already knows. In the same period Eli Whitney brought forth his cotton gin, and Hargrave, Arckwright and Bolton followd soon afterward with the spinner, and combination of machinery which made it possible to manufacture cotton into a cloth of great usefulness and of universal demand. Then, also, steam power was largely directed to manufacturing operations, rapidly increasing their extent and importance. By thus introdueing steam engines, England multiplied a hundred fold her population; by steam communication she brought, practically, the producer and consumer within a short distance of each other. She thus increased, at one and the same time, her ability to manufacture, the value of the article produced, and, by a saving in the cost of transportation, the price she was able to command. In 1797 the article of cotton was comparatively valueless, but the inventions already referred to imparted to it a value before unknown. This stimulated its growth, especially in this country, and as fast as it could be produced and prepared it was shipped to England, and has resulted in the establishment of that immense cotton manufacturing interest, which it has been boastingly said commands the world, and, especially, the conscience of Great Britain.

In 1815 England had already consumed $119,000,000 worth of the raw material. If we add to this the increased value placed upon the material by the operation of manufacture, and its carriage to market and preparation for consumption, we find it equivalent to at least $500,000,000. And this was the contribution of only one article, made available by a few inventors, to the British exchequer. And what has been true of cotton bas been true of many other articles of less importance, but in the aggregate far surpassing it in value, that have been useful to society by the application of their newly-invented machinery. Had it not been for these novel inventions, for the lives and services of their authors, the people of England could never have endured those exhausting wars, or have paid the taxes under which she labored. Unable to maintain her armies she must have been defeated in battle, and then discouraged and ruined at home her citizens would have sunk to a new barbarism.

We think this lesson, derived from the history of one of the greatest of nations, of peculiar interest to all loyal citizens, and, especially at this time, to inventors. What has been done by England can be done again by the United States. Because we are in a war is no reason why we should go backward. No country is as fertile as our own, either in inventive talent or in products capable of being applied to new purposes. Articles yet unknown may, by the ingenuity of some inventor, become new garments to clothe us; new products may feed our bodies, may be used in building our houses, and in warming our houses; and still new values may be imparted to old articles. Physical power is alone circumscribed by given boundaries; there is no limitations to results in the ever-widening field of inventions. And when the history of the world is written the brightest pages will be those that record the lives and achievements of its inventors; and they, too, will be pronounced the world's greatest benefactors.

Machines for Spooling Thread.

An interesting paper on the above subject was recently read before the Institution of Mechanical Engineers, by M. Weild, of Manchester, and has been published in *Newton's London Journal of Arts and Sciences*. Previous to the present century, sewing thread was all made up in hanks for sale, and it was not until 1814 that the mode of winding thread on spools was introduced by James Carlile, of Paisley, Scotland. Thread was first wound upon spools in soft, uneven and irregular layers, by a common hand wheel, and the top layer was made smooth by the friction of a small piece of calico pressed against it in winding. About 1830 a spooling machine was brought into use by Mr. George Taylor, of Paisley, having a single grooved guide for laying the thread upon the spool; this guide was made to traverse longitudinally by two screws geared together, so as to distribute the thread evenly upon the spool—one of the screws acting to regulate the distribution in one direction, and the other in the opposite direction. The many-grooved guide and the right-and-left-handed sciew, were introduced about 1834.

The spools commonly used are made of wood, more or less ornamented; and some also of metal, bone, ivory and other materials. Wood spools were first turned by self-acting machinery, invented in 1846 by Mr. John Clark, of Glasgow. The wood is first cut into slices, having a thickness about equal to the length of the intended spools; from these slices the blocks to form the spools are cut by means of a crown saw, which cuts a piece out of the slice in the form of a cylinder and bores a hole through its axis at the same time. The blocks are next supplied to the self-acting turning machine for turning them to the required shape and length, and are afterward finished or ornamented by a milling or stamping process.

For polishing the thread, to give it a glossy appearance, it is placed in a solution of starch, and then subjected to friction; in the first use of machinery for the purpose the thread was polished in the hank by rotating brushes. This is also done by means of machinery similar to that for sizing warp threads; and the last few layers of the thread wound upon spools for the market are polished in the spooling machine by extra pressure upon the thread guide.

The most improved hand-spooling machines at the present time are placed upon long benches, about three feet wide and two feet high, and driven by a shaft passing along under the bench. Each spooling head is driven by a friction clutch or pulley, which is made to engage with the clutch or pulley on the driving shaft by means of a treadle, pressed down by the foot of the winder. The spooling head consists of a small headstock, carrying a horizontal shaft, from the end of which projects the winding spindle that the spool is placed on. The thread guide is fixed on a sliding rod, and the alternate traversing motion is received from a shaft with a right-and-left-handed screw thread on it; the sliding rod has two arms, each carrying part of a screw not on opposite sides of the screw shaft—one to gear with the right-handed screw thread, and the other with the left-handed; so that by a slight oscillation of the sliding rod, first one and then the other nut is thrown in gear with the screw shaft.

In using the spooling head the empty spool is placed upon the winding spindle, and the thread, which is drawn from the end of a large bobbin, is passed under the thread guide, and fixed so as to wind on to the empty spool. The machine is then started, and the winder presses upon the thread guide with the left hand, giving the requisite pressure by the thumb, while the right hand reverses the traversing motion at the end of each layer of thread. When the last layer is being wound upon the spool extra pressure is generally given to the thread guide, to polish the thread and give it the glossy appearance. When the spool is filled a nick is made in the edge of the spool and the end of the thread secured in it. The full spool is then removed by means of a lever, as the repeated tight coiling of the thread has compressed the spool tightly upon the spindle The winders employed in filling the spools are mostly young women, one to each spooling head or spindle.

Several attempts have been made in England to wind thread by self-acting means on to several spools at the same time, but as a large portion of the winder's time is occupied in placing and removing the spools, and in fixing the ends of the thread to them, the advantage was found insufficient to induce perseverance for overcoming the difficulties.

Mr. Weild gave this brief history of spooling machines, introductory to the examination of a self-acting machine which he exhibited, capable of spooling twenty gross of spools per day, and requiring the attention of only one boy. It winds six spools at once, fixes the empty threads ready for winding, guides the threads on to them, and when 200 yards exactly are wound on each, it cuts nicks in the edges of the six spools, draws the end of the threads into them, then cuts off the threads, discharges the full spools and begins winding another set of empty ones. The spools are driven at a speed of 2,000 revolutions per minute, and a set of six spools are filled and exchanged in one minute. With a hand-spooling machine one attendant can spool but three gross of spools per day. One of the new machines, therefore, saves five-sixths of the labor required by the old hand spoolers.

BANK SUSPENSIONS.—On Monday, the 30th ult., a large number of banks in New York, Boston, Philadelphia and other places, suspended specie payments, but a notion has obtained currency that all had suspended, whereas the following in this city have not, namely, the America, Broadway, Chemical, City, Fulton, Greenwich, New York, Park and Seventh Ward. These nine banks pay specie as usual. Twelve banks in New York which have suspended have $22,000,000 of gold in their vaults, which is believed to be sufficient to satisfy any demand that may be made upon them.

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NOTES ON FOREIGN INVENTIONS AND DISCOVERIES.

Armor Plates for Ships.—A patent has lately been obtained by J. Hughes of Newport, England, for constructing armor plates by rolling each with three or more ribs which are afterward cut in a lathe to form dovetail tongues and grooves. The plates are thus constructed to fit into one another when placed on a vessel, and keys are driven in to wedge the joints on the inner side. This improvement is intended to obviate the expensive mode of planing a tongue and cutting a groove the whole length of each plate (like those on the edges of pine planks), as was done with the iron-clad frigate *Warrior*.

C. W. Lancaster has also secured an English patent for rolling armor plates with flanges or ribs on the back part for the reception of bolts and rivets, to secure them to the framing without punching bolt holes through the plates. The top and bottom of the plates are recessed in such a manner that one fits into that immediately above and below it, and the flange on one plate through which the bolt is passed is protected by the plate next to it.

G. F. & J. Jones have also obtained a patent for constructing the plates of war vessels of such a character that they are to be fastened in the inside by bolts passing through flanges. The plates used are of the box form to clasp the ribs of the frame. The object of these plates is to obtain a perfect shot-proof vessel having its whole strength in the outside thereby saving the great expense of a heavy wood backing.

Glass Rollers and Pistons.—Rollers made of glass and applicable for glazing cotton and other cloth, are manufactured as follows by J. Chedgey, of London. A cylindrical iron mold of a diameter and length corresponding to the roller is provided. A piston constituting its bottom is fitted in this mold, and it has a rod extending upward and held in guides. The piston rod constitutes the core of the mold and a funnel is secured on the top. The piston is pushed nearly to the top of the mold before commencing to pour in the molten glass, and it is gradually depressed as the glass is poured in, until the whole cylinder is filled, and the roller is thus cast. It is stated that a perfectly sound casting of glass is obtained in this manner. The roller is then annealed in an oven, and afterward placed upon a spindle and turned in a lathe. It is polished by applying Venetian red powder to its surface with a concave piece of wood covered with felt.

Water-Proof Bricks.—Common bricks are very porous, and during northeast rain storms in the vicinity of New York, the moisture penetrates through eighteen-inch brick walls unless their surface is coated with paint or some other protective. Various modes have been proposed and tried to render bricks impervious to moisture, and the glazing of their surface by a vitreous coat of glass has been tried. Bricks thus made assuredly keep out water, but mortar will not adhere to them, hence they cannot form a strong wall. W. C. Foster, of Lambeth, England, has taken out a patent for making water-proof brick which is alleged to meet all desired requirements. In molding the bricks, a glazing material is placed in the middle of each, this vitrifies in the burning operation, and damp therefore cannot penetrate through them, while their surfaces preserve the adhesive properties of common bricks with mortar.

Telegraph Targets.—F. N. Gisborn of London, has applied the electric telegraph to targets for shooting at long ranges. The target is so constructed and connected with electric telegraphic apparatus that when a bullet strikes it, a signal placed near the marksmen points out the part exactly that has been struck, and at the same time the hits are also registered on paper, by the apparatus.

Double Electric Battery.—D. T. Fitzgerald, of London, places a block of zinc and a plate of copper separated a short distance from one another in the moist earth. This forms a constant voltaic couple, but the current is feeble. It is combined with any of the common telegraphic batteries in use, and a more uniform electric current is thus obtained.

Vegetable Silk.—A. C. Vautier of Paris, has taken out a patent for producing a fibrous material from the mulberry tree, resembling silk, without the agency of the silk worm. The fabric has been exhibited, but the process not described.

Steamship Compasses.—C. A. Ehrenberg, of Altona, Denmark, has invented a new compass to obviate local attraction on board of steam and iron ships, on which the masses of iron are so liable to disturb the action of the needle. This inventor employs a compound magnetic needle, composed of two short needles, connected together by a strip of copper, the needles being on opposite sides of the needle cap, and the north pole of the one being opposite to the south pole of the other. In addition to this compound needle for neutralizing the effect of local magnetism, the bowl of the compass is formed of copper and the bottom of it is covered with zinc. This arrangement is for the purpose of producing a feeble electric current by the moisture of the atmosphere acting upon the zinc in connection with the copper bowl, and thus isolate the needle from the attraction of the engine, or hull of the vessel by a counter electric current in the compass box itself. The compass is inclosed in a double wooden box, having a layer of gutta percha, placed between the two thicknesses of wood. Compasses thus made are stated not to be injuriously affected by local attraction.

RECENT AMERICAN INVENTIONS.

Ordnance.—This invention consists in a breech composed of a spherical piece of metal inserted into a hemispherical seat provided in the gun in the rear of its bore, and confined therein by means of a hollow screw, which is screwed into the rear of the gun behind it, said screw having its front end countersunk to fit and form a seat for the said spherical piece, and the said spherical piece having an opening centrally through it of sufficient size, and the internal caliber of the hollow screw being sufficient to permit the projectile and the cartridge to be inserted through them into the chamber of the gun, and the said spherical piece being furnished with means for turning it to bring its opening transverse to the bore, and thereby make it close the rear of the gun, and to bring it opposite the bore for loading at the breech. Invented by Charles Alger, of Hudson, N. Y.

Slide Valve.—This invention consists, first, in arranging one or more parallel motions in combination with a slide valve in such a manner that the pressure of the steam is counteracted by the parallel motion or motions and the valve sustained in the proper place, and the said valve moves equally free and easy when subjected to the pressure of the steam, as it does when the steam is shut off; second, in the employment of a valve with corrugated elastic sides and ends, or with an elastic back, in combination with an oblong bearing of the pivot, which secures the valve to the parallel motion in such a manner that said valve, when acted upon by the steam is forced down upon its seat with a certain yielding pressure, determined by the elasticity of its sides before the pressure of the steam is counteracted by the parallel motion, and that a jumping of the valve or leaping of the steam is prevented; third, in arranging the frame which supports the parallel motion in combination with an elastic diaphragm or piston in such a manner that by the action of the steam on the under side of the diaphragm or piston the pressure of the steam on the back of the valve is partially counteracted and the pressure on the back of the valve is diminished; fourth, in the arrangement of a bell crank lever, or its equivalent, in combination with the frame supporting the parallel motion, in such a manner that said frame, together with the valve, can be raised clear off its seat and that when the motion of the valve continues after the steam has been shut off the cutting of the face of the valve is prevented. Patented by Andrew Buchanan, of Jersey City, N. J.

Escapement.—This invention consists in an escapement composed of a simple crank or eccentric wrist pin, which derives a revolving motion by its attachment to the ordinary escape wheel spindle or to any suitable rotating spindle, geared with the clock movement, and which works within a slot in the pendulum rod, as explained, such escapement dispensing with the escape wheel and the verge and its appendages, and being cheaper, more durable, less likely to get out of order, and requiring less power to run it than the verge and wheel escapement. It also consists in so applying the stud from which the above mentioned slotted pendulum is suspended, in combination with the crank pin or eccentric wrist, as to make the said stud self-adjusting, for the purpose of bringing the pendulum always in beat, thereby enabling the most inexperienced person to set up a pendulum clock without difficulty. The above invention is due to William Hart, of Mayville, Wis.

Friction Clutch.—The object of this invention is to make a clutch for connecting and disconnecting machinery, which shall hold and connect by friction alone, and act to form the friction connection by centrifugal force alone. It consists in the employment of sector friction brakes which make friction against the rim or inner periphery of a pulley attached to and turning with the shaft, the said friction brakes being connected with another wheel turning freely on the said shaft in combination with the inclined planes of a trifurcated sleeve. The patentee is Rensselaer Reynolds, of Stockport, N. Y.

School Desk and Seat.—This invention, patented by Wm. H. Joeckel, of New York city, relates to an improvement in desks and seates which are combined or connected together, and has for its object the adjustment of the desks and seats in such a manner that they may be made to suit children of different ages. By a very simple movement or adjustment the seats may also be so disposed as to be placed out of the way and admit of the children or persons readily passing between them and the desks, or for the purpose of occupying the latter.

Folding Bedstead.—F. C. Payne, of New York city, has secured a patent for a bedstead which, when not required for use, may be folded up within a very small compass with the mattress upon it; when folded the bedstead also forms a box or receptacle for all necessary bed clothing. The invention consists in having the bedstead formed of three parts connected together by joints or hinges, and arranged in such a manner that one part may be folded with the mattress over the head portion of the bedstead, and another part folded underneath the head portion, whereby the desired end is attained. This device is not only admirably adapted for camp or army use, but will also prove to be a great acquisition for families not having spacious apartments, and there are many thus necessarily situated in cities with whom economy in space is a desideratum.

Bonnet.—This invention consists in a bonnet, cap or other head covering, the body of which is made of two or more thicknesses of muslin, or other woolen fabric, united by some adhesive and stiffening substance, and shaped and formed into a series of raised stripes by means of suitable dies, in such a manner that the sewing together of said strips is obviated, and that such bonnet, cap or head covering is a perfect imitation of the ordinary bonnets or caps made by sewing together a large number of narrow braids of straw or embossed stripes of muslin. The merits of this invention are due to S. A. Blake, of New York city.

Facts about Cotton.

The stock of cotton at Liverpool December first was only sixty-seven thousand bales less than at the same date in 1860, and the stock in England was undoubtedly much larger than it was a year ago, it being well known that the manufacturers have laid in unusually heavy supplies. The English trade returns for the month of October are just published, and they show the following results as to the imports of cotton:—

In 1860.....267,367 cwts.
In 1861.....487,436 cwts.

Of these imports, the East Indies furnished 467,578 cwts. against 115,504 cwts. last year. Thus true is it, that India, as the Englishmen are in the habit of saying, "always furnishes whatever is wanted of her."

Whenever and however the civil war in this country may end, matters have already gone so far, that the cotton monopoly of the South is ended forever. If peace is made to-morrow the old cotton productiveness of the South cannot be restored in season to prevent the firm establishment of the cotton culture in so many quarters of the globe, as to destroy the control of this staple, which the slave holders once enjoyed, and by a tenure which was proof against everything but their own suicidal folly.

A HOUSE recently fell down in High street, Edinburgh, killing thirty-five persons.

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ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING DECEMBER 24, 1861.

Reported Officially for the Scientific American.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 2, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

NOTE.—The following list of claims comprises a little more than half the issue of December 24, the remaining portion not having been sent to us in time for publication in this issue. No patents will be issued between Dec. 24, 1861, and Jan. 7, 1862—the issue of the 31st ult. being omitted—and patents which should have been granted on that day will bear the date of Dec. 24.

2,972.—Charles Alger, of Hudson, N. Y., for Improvement in Breech-Loading Ordnance :

I claim the spherical breech piece, B, having a central opening, g, and the hollow screw, C, applied in combination with each other and with the barrel or body, A, of the gun, substantially as described.

2,973.—Traugott Beck, of Newark, N. J., for Improved Apparatus for Bracing the Yards of Vessels :

I claim the combination and arrangement of the cone barrels and the tightener, with the braces, substantially in the manner and for the purpose specified.

2,974.—S. A. Blake, of New York City, for Improvement in Bonnets :

I claim a bonnet, cap or other head covering, the body of which is made of two or more thicknesses of muslin, or other suitable fabric, shaped or formed with a series of raised or embossed stripes, in imitation of straw or other braid, by means of suitable dies, in the manner set forth.

2,975.—W. A. Brown, of Philadelphia, Pa., for Improvement in Railroad Car Ventilators :

I claim a ventilator, consisting of the horizontal cylinder, B, with its conical frusta, b' b', the interior spiral passage formed by the partition, d', in the rear end of cylinder, B, with the vertical cylinder, C, with its adjustable valve, F, the said parts being constructed and combined together with each other, substantially as described, and applied near each end of the roof, A, so as to operate in combination with the car in motion on a track, in the manner set forth and for the purposes specified.

2,976.—John O'Bryan, of Owego, N. Y., for Improvement in Truss Pads :

I claim the construction of the pad, consisting of the two cups, the helical spring and the adjusting screw, all combined and operating in the manner set forth.

2,977.—Andrew Buchanan, of Jersey City, N. J., for Improvement in Steam Engines :

I claim, first, The arrangement of one or more parallel motions, E, in combination with a slide valve, A, substantially as and for the purpose set forth.

Second, The employment of a valve, A, with corrugated sides and ends, or with a corrugated back, in combination with the oblong bearing, h, of the pivot, a, which connects the valve to the parallel motion, E, substantially in the manner and for the purpose shown and described.

Third, The rising and falling frame, D, in combination with the valve, A, and with an elastic diaphragm, F, or its equivalent, constructed and operating substantially as and for the purpose specified.

Fourth, The combination of the bell crank lever, G, or its equivalent, with the rising and falling frame, D, and valve, A, substantially in the manner and for the purpose set forth.

2,978.—M. D. Budd, of Roscoe, Ill., for Improved Machine for Cutting Bolts :

I claim forming the jaw, B, of two parts, c d, connected by a joint, e, said parts, c d, being provided respectively with a hook, k, and notches, l l', and all arranged substantially as shown, whereby the jaws, A B, and their cutters, C C, may be distended or spread apart at a greater distance than they otherwise could be, and admit bolts or rivets which vary materially in size, being cut with one and the same implement.

[The object of this invention is to obtain a simple hand implement for cutting off bolts and rivets, and one which may be used for operating upon larger work; that is to say, capable of cutting through bolts and rivets of larger diameter than the ordinary implements of the same dimensions.]

2,979.—P. Canhaupe, of New Lebanon, N. Y., for Improvement in Making Capsules of Copaiva :

I claim, first, The arrangement of the shoulder, c, on the mold, A, as and for the purpose, as shown and described.

Second, Dipping the capsules, A, after they have been charged, into some suitable composition, as described, for the purpose of closing them, and to produce an even and seamless surface.

[The first part of this invention relates to an improvement in the molds over which the capsules are formed, and it consists in turning the upper ends of said molds down in such a manner that a shoulder is formed, which considerably facilitates the closing of the capsules formed over said molds. The second part of this invention relates to an improved mode of closing up or sealing the capsules, by dipping them after they are filled with copavia into the same composition, from which they are made in such a manner that capsules are produced which present a perfectly smooth and seamless surface.]

2,980.—M. D. Cohen, of Philadelphia, Pa., for Improvement in Coverings for the Head :

I claim the combination, with fur laps and apron, or either, of an elastic or adjustable belt, in front and brace bands on top, arranged in the manner and for the purposes set forth.

2,981.—Jeremiah Fink, of Baldwinsville, N. Y., for Improvement in Cultivators :

I claim combining with the beam, A, of a shovel plow, the triangular or double brace wings, E E, substantially as and for the purpose specified.

2,982.—Thaddeus Fowler, of Richmond Valley, N. Y., for Improved Marking Brush :

I claim the hollow arm, c, inclined upward, from the reservoir, a, and the brush, i, at the end thereof, arranged in the manner and for the purposes specified.

I also claim arranging the marking brush, i, spring, o, and screw, g, substantially as set forth, whereby the flow of liquid is regulated by the motion of the brush, when pressed upon, as set forth.

2,983.—H. N. Fryatt, of Belleville, N. J., for Improvement in Refining and Crystallizing Sugar :

I claim the process, substantially as specified, for the admission and use in the vacuum pan of alcohol as a divisor of the crystals after the sugar has parted with all or nearly all its water of solution, for the purpose of rendering the mass miscible, and thus permit its easy flow or exit from the pan or evaporating vessel, and also be capable of netting or arranging its crystals, and parting with its fluid portions and coloring matter, whereby I am able to obtain a larger per centage of crystals than by the method before known.

2,984.—D. C. Gilliland, of Brownsville, Ohio, for Improvement in Cultivators :

I claim the combination of the draft beam, A, hinged beams, B and C, removable shanks, a b c, and attachable shares, H, shovels, I, and rake, J, all constructed, arranged and employed in the manner and for the purpose shown and explained.

2,985.—Rhesa Griffin, of Syracuse, N. Y., for Improvement in Machines for Punching Boiler Plates :

I claim a series of rods or bars, with catches or hooks arranged between two parallel ways or tracks, for a platform to travel on, thereby forming a rack, as seen at d, Fig. 2, for the latch or pall, i, as seen at Fig. 4, to set against when let down by slide, Y; also, the sway bar, n, and form of the catches, and the manner of connecting them to the sway bar, n, as seen at Figs. 6 and 7; also, the bar, m, over the sway bar, n; also, slide, A, attached to the platform, a, by set screws, k k, Fig. 3, with a slot in it, at right angles with the platform, as is also seen at A A, Fig. 5, with movable dies, t t, with holes in them for the more expeditiously adjusting of the plates or sheets of iron, for the purpose mentioned.

2,986.—William Hart, of Mayville, Wis., for Improvement in Clock Escapements :

I claim, first, The escapement, composed of a revolving crank pin or eccentric wrist, c, working within a slot, 3, in the pendulum rod, substantially as specified.

Second, Arranging the pendulum stud, e, in a plate, f, fitted to oscillate about the axis of the spindle which carries the crank pin or eccentric wrist, c, substantially as and for the purpose set forth.

2,987.—G. C. Hathaway, of Plymouth, Mass., for Portfolio and Writing Tablet :

I claim the combination of a tablet, made substantially as described, with a flexible portfolio, for the purpose set forth.

2,988.—O. T. L. Heine and E. Prussing, of Chicago, Ill., for Improvement in Journal Boxes :

We claim the construction of friction or antifriction rollers, with holes or passages cut or drilled through them, for the purpose of receiving and distributing oil or other lubricating material upon the shaft, axle, pinion and rollers, in combination with the peculiar mode of wedging, in the manner and for the purposes described.

2,989.—S. F. Hodge, of Detroit, Mich., for Improved Stamp Head for Quartz Crushers :

I claim the construction of stamp heads for crushing ores, of two metals, one of which is of greater durability than the other, the two metals bearing the relation to each other described, so as to wear away unequally on the working face of the stamp head, and thus insure the gradual production of an undulating, corrugated or honeycomb crushing face.

2,990.—W. H. Joeckel, of New York City, for Improved Seat for Schools, &c.:

I claim, first, The sliding, tilting or vertically-adjustable seat, D, in combination with the vertically-adjustable desk, F, substantially as described.

Second, The plate, H, provided with the pins, b b, and projections, c c, and attached to the upper end of tube, G, in combination with the guides, d d, attached to the under side of the seat, D, and provided with the notches, e e, the plate, H, being fitted between the guides, d d, and all arranged as shown, to admit of the sliding backward and the tilting of the seat, as described.

2,991.—W. B. Johns, of Georgetown, D. C. for, Improvement in Portable Fireplaces :

I claim the construction of the fireplace or stove, so that its sides and top shall fold compactly together, for transportation, and when set up for use shall unfold, so as to furnish a space between the outer and inner plates, to be filled with sand, or its equivalent, substantially as and for the purpose specified.

I also claim the folding mantle plate, E, in combination with the fireplace, as described.

2,992.—W. B. Johns, of Georgetown, D. C., for Improvement in Saddle Leggings :

I claim, as a new article of manufacture, constructing the leggings, with the adjustable openings, C and B, to be attached to the saddle retained upon the person, in the manner and for the purpose, substantially as specified.

2,993.—G. S. Knapp, of Dubuque, Iowa, for Improvement in Harvesters :

I claim the attaching of the axles of the wheels, C D, of a harvester or other mounted agricultural machine to arms, e H, connected to the frame, A, or body of the machine, and to a shaft, F, substantially as and for the purposes set forth.

[This invention consists in having the body of the machine mounted on wheels, which are provided with adjustable axles, so arranged that the axles of both wheels may be elevated and depressed simultaneously, and the body of the machine readily raised and lowered at the will of the driver or attendant.]

2,994.—L. G. Kniffen, of Worcester, Mass., for Improvement in Mowing Machines :

I claim, first, The combination with the front inner corner of the main frame and rear inner side of tongue, D, of shoe, I, coupling or connecting piece, A, bent bearing piece, O, its pulley, m, chain, n, and lever, P, substantially as and for the purposes set forth.

Second, The combination of piece, q, and pivoted arm, x, with shoe, I, and lever, P, substantially as and for the purposes set forth.

Third, The combination of the rigid track piece, L, with a finger beam hinged to the front inner corner of a main frame, having a hinged tongue and the elevating lever, as and for the purposes set forth.

Fourth, Suspending the front of the frame from the tongue by means of chain, Z, and arm, R, substantially as described.

Fifth, The combination of the metal piece, E, and collar, c, with axle, B, and tongue, D, as described.

2,995.—L. G. Kniffen, of Worcester, Mass., for Improvement in Cutting Apparatus for Harvesters :

I claim, first, The combinations of the elevations, e, of the guards, D, bearing pieces, d, and buttons, h, with the finger beam, C, and the cutter bar, E, arranged and operating as and for the purposes set forth.

Second, Elevating the cutter bar, E, and supporting it above the finger beam, in combination with the enlargement of the heel of the bar, as seen at k, Fig. 1, as and for the purposes set forth.

2,996.—C. B. Lashar, of New York City, for Improved Car Brakes :

I claim the combination of the bearing of the brake standard with the brake shoes by mechanism, in such manner that the pressure exerted upon the said bearing is propagated to the brake shoes, substantially as described.

I also claim the combination of the brake mechanism of a car with a thrust plate that projects in advance of the bumper of the car, and intervenes between it and the bumper of the adjacent car when the cars are coupled together, substantially as set forth.

I also claim the combination of the brake mechanism of a car with two reversible thrust plates, each capable of being placed either in the line of motion of the bumper or out of that line of motion, substantially as set forth.

2,997.—T. J. Mayall, of Roxbury, Mass., for an Improvement in India Rubber Mats for Foors, &c.:

I claim constructing india rubber or gutta percha mats, substantially as set forth, i. e., providing the bottom or base with vertical projections or starts, of such form and relative arrangement that, while affording great facility for the cleaning of the mat, they shall act upon the boot or shoe not only as a scraper, but also as a brush, and that they shall adapt themselves to and fit into the irregularities or curved portions of the same, whereby every portion of the boot or shoe can be readily cleaned.

2,998.—William McKain, of Conoy Township, Pa., for an Improvement in Mode of Preventing the Destruction of Bolting Cloths in Flouring and Grist Mills :

I claim the combination of the tin-plate heads, A and C, by the flange, B, with the wire screen, F, the rolling tubular knockers, M N, and arrangement of the winged shaft with the feeding spout, I J, substantially as set forth for the purpose specified.

2,999.—Solomon Mead, of New Haven, Conn., for an Improvement in Hot-Air Furnaces :

I claim the combination of the external spiral air passage, A I C, internal spiral air passages, P H C', spiral flues, S, and separate conducting pipes, g and g', all arranged in the manner and for the purposes shown and explained.

3,000.—S. G. Morrison, of Williamsport, Pa., for an Improved Canteen ;

I claim the application to canteens of a cone or cape of any elastic material, which, by inverting, may form a funnel on the canteen, or removed therefrom may be used as a cap, substantially as and for the purpose specified.

3,001.—David Mumma, of Mount Carroll, Ill., for an Improvement in heating Skin without removing the Hair or Fur :

I claim taking the skin in a dry or fresh state, and immediately immersing them in the tanning liquid, so that sufficient of the liquid remains in the skins, when coming in contact with the second ingredient, to destroy the gum without loosing the fur, substantially as specified.

3,002.—Peter Naylor, of New York City, for an Improvement in Casting Balls for Rifles :

I claim the employment of a die, 3, at the opening through which metal is poured, in the manner and for the purpose specified.

3,003.—A. W. Olds, of Green Oak, Mich., for an Improvement in Rotary Harrows :

I claim, first, The vertical and interchangeable adjustment of the wheels, I I, by means of the axles, G, bolts, H H, and slots, H' H', as and for the purpose specified.

Second, I claim placing the flange, D, in such position in relation to the sleeve, C, that the axletree, E, may be of one entire piece, as described.

Third, I claim the wedge, F, when placed between the bottom of the flange, D, and the axletree, E, as and for the purpose set forth.

3,004.—S. J. Parmele, of Killingworth, Conn., for an Improvement in Corn Shellers :

I claim, first, In combination with one or more ribbed or toothed shelling cylinders, B B', a concave pressure plate, C, suspended by an universal joint, D, substantially as shown, for the purpose of allowing the plate, C, to adjust itself to the ear of corn while being shelled, and and ensure the perfect shelling of the same, as set forth.

Second, The ribbed cylinders, B B', concave pressure plate, C, yielding screw, F, and door or flap, I, all combined and arranged for joint operation as and for the purpose set forth.

[This invention consists in the employment or use of a ribbed cylinder having different rates of speed, in connection with a yielding corrugated concave screen, and guard door, so arranged for joint operation that the corn may be rapidly shelled from the ear, and the shelled corn separated from the cobs.]

3,005.—F. C. Payne, of New York City, for an Improved Folding Bedstead :

I claim a folding bedstead formed by the combination of the three frames, A B C, with a mattress, D, when arranged as shown and described, to admit of the frames and mattress being folded and at the same time form a box or receptacle for the bed clothes, as set forth.

3,006.—William Pierpont, of Salem, N. J., for an Improvement in Straw Carriers and Grain Separators for Thrashing Machines :

I claim, first, The combination with the an elongated, perforated apron, operated by a crank or cranks, having the peculiar motion described, of a series of feeding and separating teeth, b, substantially as and for the purposes set forth.

Second, The combination of a tight apron, J, with an elongated apron or pierced platform, hung upon and worked by a crank or cranks, having the peculiar motion described, connected with and forming a part of the thrashing and separating machine, substantially in the manner and for the purposes described.

3,007.—William Rankin, of New York City, for an Improvement in Tents :

I claim the combination of the lateral hinged, adjustable braces, C, with the divided hinged bars, B, and pole, A, as shown and described.

I also claim the combination of the sacking, D, with the hinged adjustable braces, C, bars, B, and pole, A, substantially as shown and described.

[The object of this invention is to obtain a tent which may be put up or adjusted with great facility, be perfectly strong and rigid when thus adjusted, and also afford great conveniences for berths, the same being elevated above the surface of the ground. The invention also admits of being compactly folded for transportation.]

3,008.—Rensselaer Reynolds, of Stocksort, N. Y., for an Improvement in Friction Clutches :

I claim connecting the longitudinally sliding sleeve with the radial arms of the sector friction brakes, so that when the same is liberated the centrifugal force generated by the rotation of the brakes before the clutching takes pace, will force the friction brakes, outward against the inner periphery of the fast pulley, and thereby clutch the same, and by moving the sleeve longitudinally on the loose pulley in one direction shall, by means of the inclined planes, cause the sector friction brakes to move away from and break contact with the inner periphery of the fast pulley, thus unclutching or disconnecting the pulleys by inclined planes, and clutching the same wholly by centrifugal force, substantially as described.

3,009.—A. K. Rider, of Hydeville, Vermont, for an Improvement in Cut Off Gear for Steam Engines :

I claim the employment for controlling the closing movements of the cut-off valves, of two obliquely arranged sectors or segments, L L', on a shaft or rod, K, which has a longitudinal reciprocating movement and an oscillating movement upon its axis, derived substantially as described.

3,010.—E. P. Russell, of Manlius, N. Y., for an Improvement in Harvesters :

I claim, first, The conical rollers, in combination with the oval or bead on the flange, as set forth and described.

Second, I claim the oval or bead on the flange, c, either without or with the bevel, from the shaft to the edge of the flange, as set forth and described.

3,011.—John Scheeper, of New York City, for an Improvement in Mode of Securing Carriage Wheel Hubs on Axles :

I claim the hub, A, axle journal, B, flanged cap, D, pin, b, collar, a, band, e, and screw, d, when combined, arranged and operating in the manner substantially as described.

[The object of this invention consists in a simple and efficient device for securing carriage-wheel hubs on their axles, whereby the attachment is made more secure and the wheel prevented from casually working off, while lateral movement of the hub on its axle is also prevented, without interfering with the free rotary movement of the hub, at the same time giving a neater and better finish to the wheel.]

3,012.—Anthony Smith (assignor to himself and W. H. Brodley), of Hartford, Conn., for an Improvement in Revolving Fi earms :

I claim the improved method of ejecting the discharged cartridge by the simple act of inserting a fresh one in the rear thereof, substantially as described, by means of suitable depressions or openings of the frame or stock of the firearm, both in the rear and in front of the perforated cylinder, and in line therewith, the cartridge being held in place by the double retaining spring, i and i', or their mechanical equivalents, substantially as shown, so that the said arm may be kept in constant readiness for firing by the single operation of continued loading.

3,013.—C. Stauf and C. J. Steinbach, of St. Louis, Mo., for an Improvement in Portable Battery or Platoon Gun :

I claim a portable battery or platoon gun, consisting of a horizontal chambered cylinder, or its equivalent, with divergent barrels, all constructed and operated substantially as described and for the purpose set forth.

3,014.—A. C. Twining, of New Haven, Conn., for an Improvement in Apparatus for Cooling and Freezing :

I claim, first, The construction of freezing cisterns by pipes ranged in stacks, in combination with a supply or an exit pipe and connecting channels conducting the circulation from one stack or cistern to another; all substantially as above, and whether with or without the cocks.

Second, I claim the four way cocks in their construction, and the

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combination of those cocks, or their equivalent, with the channels and the stacks, or with the stacks directly.

Third, I claim the equalizer.

Fourth, I claim the combination of the splash pump with the cisterns by pipes and valves, substantially as above.

Fifth, I claim the combination of an air pump with a tightly covered vessel or vessels, to draw air from the vessels and contents during freezing, by intervening pipes or connections.

Sixth, I claim the peculiar mode of connecting the stacks with the channels, and channels with the cocks, or other pieces, as shown and described.

3,015.—William Van Anden, of Poughkeepsie, N. Y., for an Improvement in Harvesters :

I claim, first, The combination of the adjustable bolts, O O, with the adjustable bars, R, and with the main frame and axle, for the purpose and in the manner described.

Second, The combination and arrangement of the adjustable cutter bar holder, U, and cutter, V, with the finger bar, E, substantially described, and for the purpose set forth.

3,016.—J. H. Wells, of Brooklyn, N. Y., for an Improvement in Automatic Primer for Firearms :

I claim, first, The combination with a firearm of a hopper and a slide or its equivalent, which is operated by the cocking and letting go the hammer of the gun, and by other manipulation of the arm to bring and deliver the priming pills to and at the point of explosion, said parts being so constructed and arranged, as described, as to receive the said pills from the mass, without any previous arrangement in order being necessary, and to deliver them single in succession, as set forth.

Second, The combination of the slide, 4, vibrating arm or catch, 7, or other catch performing its functions, catch, 8, and spring, 10, substantially as described for the purpose of attaching the slide to and detaching it from the hammer, so as to make it operative, or otherwise, as desired, for the purpose set forth.

Third, The construction, as described, of the chamber or reservoir for containing the pills or priming material in two compartments so formed and arranged with reference to each other that the smaller compartment of the one which is over the opening in the slide, will receive the pills freely from the other compartments, and have a tendency to retain them, substantially as set forth.

3,017.—John Wilson, of Chicago, Ill., for an Improved Manufacture of Fibrous Waterproof Fabrics :

I claim the new article of manufacture described, constituting a waterproof fabric, having both surfaces capable of securing a cloth finish.

3,018.—Joseph Wood, of Red Bank, N. J., for Improvement in Frogs for Railroads :

I claim the combination of rails, h and l, connected together and prolonged from the rails, e and b, with the frog point, n, in the manner and for the purposes specified.

3,019.—James S. Yerk and G. H. Heming, of Tiffin, Ohio, for Improvement in Bridges :

I claim, first, The use of longitudinally-described tubes in the construction of truss frames, substantially as described.

Second, Casting or molding the panels of truss frames in longitudinal sections, each section embracing half of the upper chord and cross braces, and a portion of the shoe or heel post, as set forth.

Third, The manner above described of connecting the sections of one panel to those of another in truss frames when the said connections embrace within themselves the shoes or heel posts, as stated.

PATENTS FOR SEVENTEEN YEARS.

The new Patent Laws enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from $30 down to $15. Other changes in the fees are also made as follows :—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for Design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, exception reference to such countries as discriminate against citizens of the United States—thus allowing English, French, Belgian, Austrian, Russian, Spanish, and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms.

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN ; and as an evidence of the confidence reposed in our Agency by the Inventors throughout the country, we would state that we have acted as agents for more than FIFTEEN THOUSAND Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors and Patentees at home and abroad. Thousands of Inventors for whom we have taken out Patents have addressed to us most flattering testimonials for the service we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time and on the most liberal terms.

The Examination of Inventions.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The point of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

Preliminary Examinations at the Patent Office.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the pro pects of obtaining a Patent &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. More than 5,000 such examinations have been made through this office during the past three years. Address MUNN & CO., No. 37 Park-row, N. Y.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention. If susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fees by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & Co., No. 37 Park-row, New York.

Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats, in English and German, furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

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We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

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Circulars of information concerning the proper course to be pursued in obtaining Patents in foreign countries through our Agency, the requirements of different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our Branch Offices.

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The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park-row, New York.

TO OUR READERS.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on Design Patents, when two good drawings are all that is required to accompany the petition, specification and oath, except the government fee.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper w n he time for which it was pre-paid has expired.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application at this office. Address MUNN & CO.,
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RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given ; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona fide* acknowledgment of our reception of their funds.

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Notes and Queries

J. J. B.—You do not give sufficient data for calculating the power of the water in your race. We have very little doubt, however, that you will find it impossible to turn it to any practical use.

F. B., of N. J.—We are not familiar with the terms upon which engineers are admitted into the revenue service of the country. This branch of the services is under the direction of the Secretary of the Treasury, to whom we refer you.

T. A. H., of Ill.—If you have any doubt about the practicability of your invention, the only way to settle it will be by actual trial If you have not the means yourself, you must try to get some one to aid you. Inventors frequently do this.

J. H., of Mass.—We do not know the exact number of the present clerical force of the Patent Office. Business is conducted with considerable alacrity, but cases are not disposed of as rapidly as they ought to be.

"Improvement," of N. Y.—On page 113 of the last volume you will find an illustration of the machine used in rifling cannon for the United States army. It is as simple and efficient as any that we have seen described.

A. W. B.—Asks the following questions :—"Suppose that A obtained Letters Patent on improvements in corn planters claiming 'check-rowing corn by means of the dropping slides' &c., to do which, at every cross mark he raised or depressed the handles ; and five months subsequent to that, B patented improvements on the same kind of machinery. Several years after that B reissues, and then claims 'operating the seed dropping mechanism by hand or by an attendant in contradistinction to automatic dropping,' at the same time ante-dating six months, does B's re-issue and ante-dating prevent A from ante-dating and re-issuing now?" Ans.—No. "Is not B's claim referred to, invalid ? Ans.—Yes, unless he was really the prior inventor. "Could not A secure same claim now by showing the originality of invention ?" Ans.—Probably he could. "Are not antedated claims inoperative as against other claims patented within the time covered by the ante-dated claim?" Ans.—Not necessarily. It depends on whether or not the ante-dator was in fact the prior inventor. "In re-issues are the new claims additional to the original ones, or are they the only claims then, on the invention?" Ans.—Sometimes the re-issued patent contains the original claims with new ones added, and sometimes the claims are all new. "Can an original inventor prevent a subsequent inventor from manufacturing his invention, if an infringement, however trifling that infringement may be, and thereby monopolize the whole to the public detriment, or can the subsequent inventor, by offering or paying proper tariffs, manufacture and sell against the will of the original inventor?" Ans.—No person has a right to infringe in any degree. The exclusive privilege of sale or use belongs to the patentee. "By such monopoly all subsequent improvements, involving any infringement of original patents, however trifling the infringement, are lost to the inventor and public, if the first inventor objects to their use by others; whilst, if for a fair compensation, he would grant to others the right to use, he, they and the public would be alike benefited." Ans.—We have yet to see the first inventor who was unwilling to receive compensation for the right to use his improvement. "If the law allows such exclusive monopoly it is wrong, because all subsequent improvements are at the mercy of the original inventor, and inventors become discouraged because their own inventions become useless in their hands after being patented." Ans.—Practical experience shows that your view is wrong, and the law right.

O. B., of Ohio, asks the following questions :—"From among the well known principles of mechanism, as for instance the gear wheel, the crank, the spring, the joint, the pinion, &c., can any one, by applying these to new and useful uses in machinery, be said to have invented anything but an arrangement or combination?" Ans.—Yes. Something more than a mere arrangement might, under certain circumstances, be claimed. "Can a motion, simply considered be a patentable idea, or must a patent attach to something material, or pertain to the device that causes motion ?" Ans.—It depends upon the result produced by the motion. "If motion in itself is not patentable, then can a similar motion be produced but by a different device, without infringement upon a former patent, provided, always, it is useful, and a better arrangement than the former?" Ans.—If the claim rested upon the production of a motion in a given way, and some other mechanism produced it in a different way the use of the latter machine would not be an infringement.

P. H. W., of N. Y.—You can obtain all the information you require about the picking machines by addressing a letter to the Lowell Machine Works, Mass.

H. G., of Mo.—There was never a more favorable time for you to apply for a patent, and to bring your invention before the public than the present. The administration of the Patent Office is liberal in its construction of what is patentable. Patents which were granted in 1848, must be extended in 1862 if demanded.

A. A. A., of Pa.—We thank you for sending us the description of the boat, and we should publish it if we had any means of learning that it is reliable.

E. A. S., of N. Y.—Your idea that the ocean in its deepest parts reaches to the liquid interior of the earth we do not regard as probable.

A. J. B., o Colorado Ter.—The patentees of the alloy for making dies and stamps, described on page 236, Vol. V. new series SCIENTIFIC AMERICAN, can give you all the information you desire respecting its nature and composition.

C. A. H., of Ill.—We are not acquainted with any substance or composition but india rubber that is capable of rendering muslin water-proof, elastic, and capable of withstanding the heat of summer without becoming sticky. The discovery of a new cheap compound of this character capable of being applied in solution would be invaluable and could not be purchased for a hundred times the sum ($30) you have offered for it.

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A. J., of Mass.—The black varnish used for coating the interior of telescope tubes is made by mixing lamp-black with thin lac-varnish. The latter should be made with alcohol. This is the best dull black varnish known to us for coating the front sights of rifles.

Money Received

At the Scientific American Office on account of Patent Office business, during one week preceding Wednesday, Jan. 1, 1862:—

E. and T. S. N., of Mass., $25; W. H. A., of Conn., $25; J. C., of Conn., $15; T. V., of Cal., $25; J. S. W., of Va., $40; E. and A. B., of N. Y., $25; S. J. T., of N. Y., $25; M. S. W., of Pa., $15; J. H. I., of Ill., $15; P. J. C., of Conn., $28; F. C., of N. H., $25; C. R. M. W., of N. Y., $40; M. and S. G. T., of Ohio, $10; A. S. J., of Ill., $15; E. M. J., of Conn., $30; A. J., of Iowa, $25; Z. K., of Mass., $15; G. M., of Conn., $65; W. D. B., of Mass., $15; J. W. A., of N. H., $25; J. B. W., of Conn., $10, W. B. F., of Mich., $25; E. B. McC., of Conn., $25; J. C., of Mass., $25; J. S. M., of Pa., $25; K. & B., of Pa., $20; G. M. Z., of O., $15; G. McN., of Pa., $25; B. & A., of Mass., $25; C. G., of Mass., $15; D. C. H., of Pa., $15; P. L. B., of Mich., $15; R. H. J., of Ill., $20; S. R. W., of R. I., $40; G. & H., of Mass., $20; W. W. F., of Iowa, $20; A. B., of N. Y., $20; M. C., of Me., $20; J. B. S., of N. Y., $20; S. D. T., of Mass., $20; W. W. W., of Ill., $20; H. C. S., of Me., $20; Van W. M., of N. J., $45; H. & H., of Ill., $20; F. S. M., of N. Y., $20; S. S. W., of Pa., $20; J. A. R., of R. I., $43; E. & W., of N. Y., $20; C. B., of Pa., $20; E. S., of N. Y., $20; A. S., of N. Y., $25; C. H. H., of N. Y., $25; T. G. G., of N. Y., $25; H. & H., of Ill., $20; A. S. J., of Ill., $15; J. L. P., of N. Y., $20; T. B., of N. Y., $15.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from Dec. 24 to Wednesday Jan. 1 1862:—

A. S., of N. Y.; C. H. H., of N. Y.; S. J. T., of N. Y.; E. & A. B., of N. Y.; E. F., of Cal.; W. & A., of Conn.; J. S. W., of Va.; E. & T. J. N., of Mass.; T. V., of Cal.; T. G. G., of N. Y.; J. D. C., of Conn.; P. J. C., of Conn.; M. W. C., of Cal.; A. J., of Iowa; G. M., of Conn.; E. M. J., of Conn.; F. C., of N. H.; J. C., of Mass.; J. A. B., of Mass.; C. R. M. W., of N. Y.; G. McN., of Pa.; E. B. McC., of Conn.; J. S. M., of Pa.; J. W. A. of Mass.; W. B. F., of Mich.

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NEW YORK OBSERVER FOR 1862.—IN ASKING the aid of all who may desire to extend the circulation of the *New York Observer*, it is proper for us to state distinctly the position it occupies with reference to the present condition of public affairs in our beloved country.

Having always maintained the duty of good citizens in all parts of the land to stand by the Constitution, in its spirit and letter, when that Constitution was assailed and its overthrow attempted, we accordingly at once gave a cordial support to the Government in its patriotic endeavor to assert its lawful authority over the whole land. Believing secession to be rebellion, and when attempted, as in this case, without adequate reasons, to be the highest crime, we hold

1. That the war was forced upon us by the unjustifiable rebellion of the seceding States.

2. That the Government, as the ordinance of God, must put down rebellion and uphold the Constitution in its integrity.

3. That every citizen is bound to support the Government under which he lives, in the struggle to reëstablish its authority over the whole country.

4. That the Constitution of the United States is the supreme law of the Government as well as of the people; that the war should be prosecuted solely to uphold the Constitution and in strict subordination to its provisions: and the war should be arrested, and peace concluded, just so soon as the people now in revolt will lay down their arms and submit to the Constitution and laws of the land.

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The state of the country renders it important for us and esirable for the churches, that a new and earnest effort be made to extend the principles of good government and sound religious truth into all the families of the land. In every neighborhood there must be some who do not now take a religious newspaper, and who might with a little exertion be induced to subscribe.

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KAUFMAN'S HOME-MADE CORN-BROOM.

The manufacture of corn brooms is a very extensive industry, consuming directly and indirectly, a vast amount of labor. The corn is bought by the manufacturers from the farmers, carted to the manufactory, made into brooms, which are sent to the large cities for sale, where they are bought by country merchants and carried back to the country to be retailed to the farmers who raised the product from which they are made. The corn producer is obliged to pay for all of this transportation, besides the several profits of the manufacturers and traders. The invention here illustrated is intended to save all this unnecessary labor, by enabling every farmer to make his own brooms from his own corn. It is well known that by the present mode of manufacture, the corn is fastened to the handle by being bound with wire or cord, the labor being performed by a skilled workman who has learned the trade. By this invention the corn is secured to the handle by means of simple brass clamps which may be applied by any one.

Fig. 1 of the engravings represents the broom complete, Fig. 2 shows the clamps and end of the handle without the corn, and Fig. 3, the mode of fastening the clamp to the handle. Through a slot in the end of the handle a brass block, *a*, is passed. In the end of this block are holes for screws by means of which the two clamps, *b b*, are secured to the handle. The ends of these clamps are bent at right angles, and slide one within the other. The buts of the corn are passed between the clamps and tied at their upper ends around the handle, while the clamps grasp them at a point lower down and hold them securely in place; the clamps being drawn together by two screws beside the one that passes through the handle.

In placing the corn between the clamps the long pieces are placed upon the outside, and these only reach up to the cord, the shorter pieces in the middle extending only two or three inches above the clamps.

When the corn is worn out, it may be replaced by a fresh supply; and thus one handle with its set of clamps will serve for a great number of brooms.

The patent for this simple and valuable invention was granted, through the Scientific American Patent Agency, February 19, 1861, and further information in relation to it may be obtained by addressing the inventor, Daniel Kaufman, at Boiling Springs, Pa.

THE British government has again commenced to issue 100-pounder Armstrong guns.

PLATT AND ROSECRANS'S STAR BURNER.

Among the hundreds who have been busying their brains in the effort to devise a lamp that would burn coal oil perfectly without smoke or odor, and without the tall chimneys in general use, are Dr. A. H. Platt, of Cincinnati, and Gen. W. S. Rosecrans, of the U. S. army. After more than four years' labor,

Fig. 1

and the expenditure of some $1,500 in experiments, they believe that their efforts have been crowned with complete success, as will be seen by the following letter from Gen. Rosecrans.

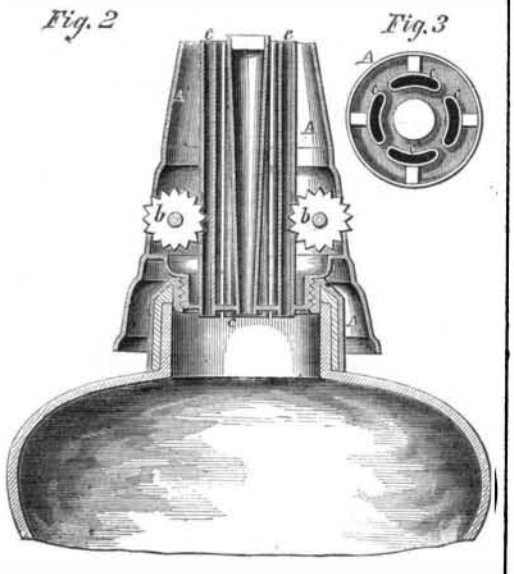
"MESSRS. EDITORS:—Returning home for a few days, after six months' absence, I find a patent has been issued for a valuable invention in coal-oil lamps to Dr. A. H. Platt and myself. Having been a reader of your paper for many years, I feel desirous that you should see and express your opinion of it in the SCIENTIFIC AMERICAN. I consider it has accomplished all that can be done toward making coal oil convenient for domestic use, dispensing with all but a short glass chimney to give steadiness to the blaze.

"W. S. ROSECRANS.

"Yellow Springs, Ohio, Dec. 9, 1861."

The lamp is clearly represented in the accompanying engravings, of which Fig. 1 is a prospective view, Fig. 2 is a vertical section and Fig. 3 a horizontal section through the burner.

Fig. 2 *Fig. 3*



The burner, A, is in the form of a truncated cone, as usual, and it contains four wick tubes, *c c c c*, but slightly converging toward their upper ends. Into these flat bands of wicking are inserted, with the twilled side out, and the hight of the wicks is adjusted by means of the spur wheels, *b b*. The flame is surrounded by a glass chimney only four inches in hight, which supports near its top a small neat shade; the whole forming a compact and very beautiful lamp. In accordance with the request of Gen. Rosecrans we have tried the lamp, and are very much pleased with it in every respect. It burns coal oil without giving out any smoke or odor, and gives a steady white and brilliant light.

The American patent for this invention was granted Oct. 5, 1861, and applications have been made for patents in Europe. Further information in relation to the matter may be had by addressing Dr. A. H. Platt, Yellow Springs, Ohio. (See advertisement on another page.)

HAWAIIAN RICE.—The *Polynesian* states that the culture of rice has been commenced, and goes on promisingly near Honolulu. About 200 acres of it are under cultivation, and in six months it is expected that half a million pounds will be raised. Other islands of the Polynesian group are also commencing to cultivate rice. The rice of Honolulu is equal to that of Carolina, and it yields about 3,850 pounds to the acre.

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